

Flight, August 13, 1910.

FLIGHT

First Aero Weekly in the World.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

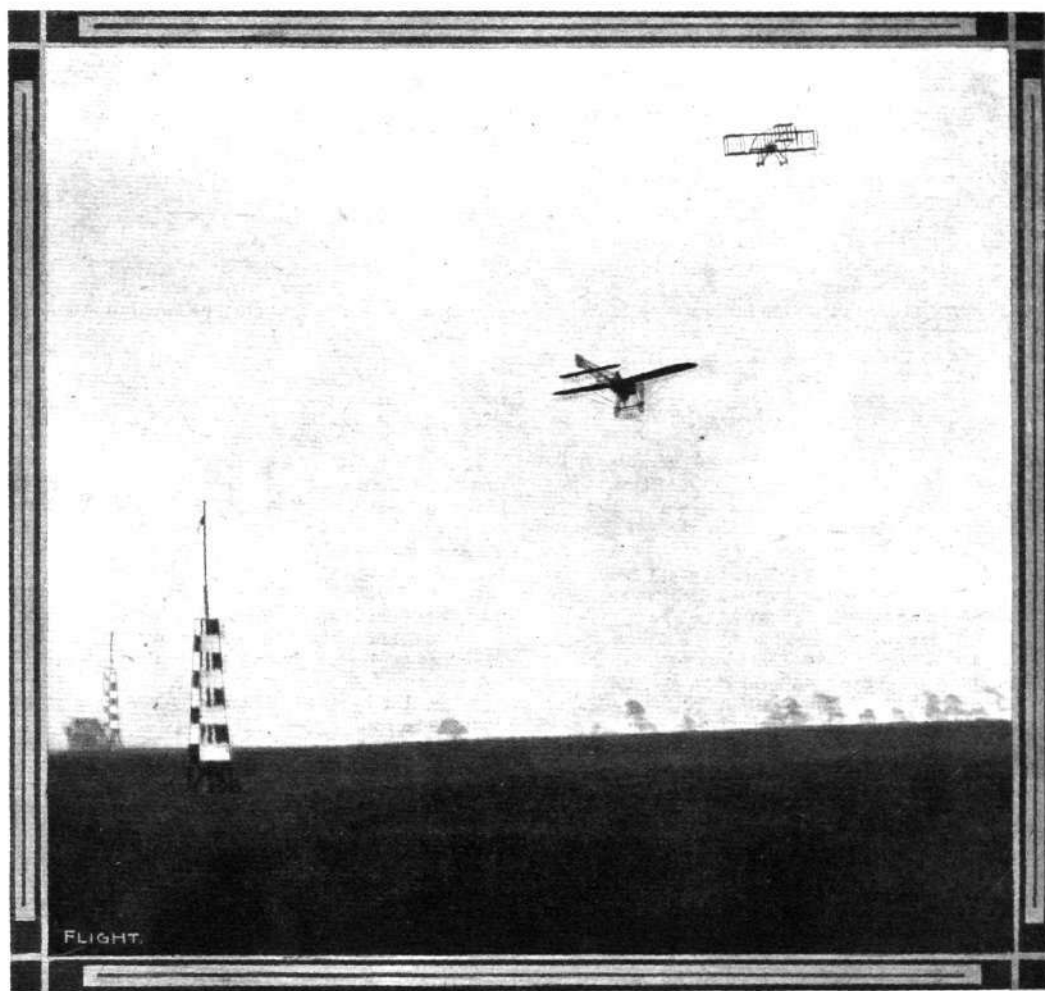
OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 85. (No. 33. Vol. II.)

AUGUST 13, 1910.

[Registered at the G.P.O.
as a Newspaper.]

[Weekly, Price 1d.
Post Free, 1½d.]



Captain Dickson, on his Henry Farman, and Cattaneo, on his Blériot, in the air at the same time at the Lanark Flight Meeting.

AERONAUTICAL TERMINOLOGY.

WE invite discussion on the terms employed in the following article, which has been written in this style in order to illustrate at one and the same time the meaning of each term and its use in technical writing. It is eminently desirable that the best possible words should come into immediate and general use, so that the remarks of all writers on the subject may be without ambiguity. A discussion at the present moment is appropriate, because the Aeronautical Society of Great Britain are already at work on a vocabulary of technical terms. In the following article references to balloons, kites, gliders, and other motorless machines are purposely omitted.

The science of *Aeronautics* has two distinct branches, *Aerostatics* and *Aerodynamics* (or *Flight*). These relate to the two principal departments of the art of *Aerial Navigation*, which are, respectively, *Aerostation* and *Aviation* (or *Flying*). The art of aerial navigation is practised by *Airmen*, who are either *Aeronauts* or *Aviators*, according as the *Aerocar* that they control is an *Airship* or an *Aeroplane*. Aeronauts and aviators can qualify as *Pilots* in their respective departments, and the pilot of an airship commonly needs the assistance of a *Helmsman* and an *Engineer* in the execution of his duties, although at the present time the aviator combines all three capacities. Airships and aeroplanes are docked in constructed *Sheds* or natural *Harbours*, and are taken out for practice in an *Aerodrome*, for which the essential quality is a certain amount of even ground for landing.

The linear size of an aeroplane is defined by its overall *length*, its overall *span*, and its overall *height*. Its *weight* is expressed in pounds with pilot and fuel for so many hours' duration of flight, and it is supported by a certain number of square feet of effective *area*, thus producing a *loading* of a certain number of pounds per square foot.

Aeroplanes are at present of the following types:—The *Monoplane*, which has one pair of outstretched *wings*; the *Biplane*, which has two *planes*, one above the other; and the *Triplane*, which has three *superposed* planes. In the monoplane, the planes are attached to a *body*, which is mounted on a *carriage* supported on the ground by *wheels* or *skids*. In addition to the main planes mentioned above, most aeroplanes have *tails* for the sake of *natural stability*, but such stability is only relative, and the aeroplane needs to be controlled against *tilting*, *canting* and *swerving*. An *even keel* is acquired by the manipulation of the *elevator*, which is *tilted* or *dipped* according as its leading edge is raised or lowered. *Balance* is maintained by the use of *balancers*, which are commonly hinged flaps on the main planes. In many cases an aeroplane is balanced by *warping* the main planes, and the same operation is used for purposely *canting* the aeroplane in flight. *Steering* is effected by a *rudder*, which is put over to the words of command, *port* and *starboard*, according as it is required to avoid an obstacle on the left or the right respectively of the *line of flight*. The elevator, being a means of altering the *attitude* of the aeroplane, is thus the organ for directing *ascent*.

In addition to the members already enumerated, a biplane is often fitted with vertical surfaces in the form of *panels*, which are commonly placed between the upper and lower main planes and the upper and lower tail

planes. Some machines have also *fins*, which, as their name implies, are fixed vertical surfaces placed above or below the body of the machine, and, of course, edge-on to the line of flight. The planes of an aeroplane always fly in *broadside aspect*, for the sake of efficiency. The linear dimensions of a plane, measured in a straight line (in the line of flight) from the *leading edge* to the *trailing edge*, is termed the *chord*, and the ratio of the chord to the span is termed the *aspect ratio*; it is supposed to be a measure of efficiency, other things being equal. It has been demonstrated by experiment that planes which are *cambered* between the leading edge and the trailing edge are more efficient than those which are *flat*. The *camber* of a plane is the maximum distance of any point in its surface from the chord. Most modern planes are *double surfaced*, and the *thickness* of the plane is, therefore, the distance between the top and the bottom surfaces. The top surface is *convex* and the bottom surface *concave* to the earth, in flight. They are separated by a framework, commonly made of timber, consisting of longitudinal *ribs* and transverse *spars*. The ribs are shaped to give the requisite camber.

Timber is at present employed in preference to metal in the construction of aeroplanes, and in most cases the design of the framework is based on the principle of some recognised form of *girder*. The body of a monoplane is very commonly a *lattice box-girder* of tapering section, the main longitudinal *booms* being separated by *struts* and braced by wire *ties* arranged diagonally between the struts. Strip steel is now often preferred to wire for the more important main ties; stranded wire cable is seldom used.

An aeroplane is supported in the air by the *aerodynamic* reaction of the air itself, which is swept downwards by the *flight* of the planes. Two aeroplanes flying near one another may be disturbed by each other's *draught*, and it is supposed that an aeroplane, like a ship in the water, drags a certain amount of air behind it in the form of a *wake*. Of the factors that contribute to the *lift* of a plane, its *angles* are all important. The attitude of a plane is defined by the *angle of inclination* between its chord and the horizon; this angle may be positive or negative. The *angle of entry* is formed by the mean tangent to the leading edge with the chord, and the *angle of trail* is similarly formed by the mean tangent to the trailing edge with the chord. The angle formed by the intersection of the two mean tangents is the *angle of deflection*, that being the amount in degrees by which a particle of air will be deflected from its initial path if it enters tangentially at the leading edge and is discharged tangentially at the trailing edge. The amount of air that is simultaneously deflected by a plane in flight consists of a *stratum*, the effective depth of which is called the *sweep*. There is reason to suppose that the effective sweep of a plane is approximately equal to its chord, for which reason it has been common practice to separate the two planes of a biplane by a *gap*, which has a vertical dimension numerically equal to the chord. In some cases the planes of an aeroplane are *arched* by curving their transverse spars; in other cases, particularly in some monoplanes, they have a *dihedral angle*, by which it is meant that the wings slope upwards and outwards from the body. Both systems represent principles that are supposed to confer a degree of natural stability.

FLIGHT PIONEERS.



MR. LANCELOT D. GIBBS.

SCOTTISH INTERNATIONAL FLIGHT MEETING.

By OUR SPECIAL COMMISSIONER.

It was natural that the first flying meeting in Scotland should arouse considerable interest, for the Scot has ever had a leaning towards applied science, and in the west, where every other man is an engineer, the subject of flight has taken a wonderful hold on the popular mind. When the meeting was first suggested by the Scottish Aeronautical Society, however, the idea met with a rather cool reception, and but for the energetic action of the Lord Provost of Glasgow the Lanark meeting would never have materialised. As a result of the Lord Provost's interest a strong committee was formed, and Mr. R. J. Smith, the able Secretary of the Scottish Automobile Club, was appointed secretary of the meeting. Since then everything has been done to make the week a successful one, and it must be gratifying to the promoters to be told by those with experience of most European meetings that the arrangements surpass any previous efforts. To be within reach of the large centres of population a place had to be chosen within about equal distances from Glasgow and Edinburgh, and the Lanark racecourse, taking everything into consideration, offered the best choice. The course lies within a mile of the town and stands high, although it is practically surrounded at a distance by hills of considerable height, which necessarily give rise to "fluky" currents. The course proper is open, and for the most part of admirable surface, while a good feature is the absence of sharp turns. The length of the circuit is 1½ miles, and there is a good stretch of turf for starting before the timekeepers' hut is reached. The hangars being at the west end of the ground has one disadvantage, this being that with the prevailing westerly breezes the aviators have the wind at their back for starting, which makes quick rising impossible. Unless there is a particularly calm day or some special arrangement is made for the starting competition, no records are likely to be broken in this direction.

The entries, which are twenty-two in number, are annexed. It is notable that half the entries are British, and no fewer than six of the machines were built in England, and the same number of engines. As regards the types of machine, biplane and monoplane find practically equal favour, the latter having had a majority of two. The Gnome is the most popular engine, no fewer than twelve being fitted, while the remainder are such diverse makes as Humber, Green, E.N.V., Bollée, Clerget, Panhard, Clement-Bayard, and J.A.P. It will be seen then that the competitors and their machines are thoroughly representative of the latest practice.

The competitions and prizes are:—

1. Long Distance Competition (3 days).—Total prizes £940. Special prizes £100.
2. Cross-Country Flights (3 days).—Total prizes £1,610. Special prizes £200.
3. Aggregate Long Distance.—Prizes £1,100.
4. Speed Competitions (each day).—Total prizes £1,565.

5. Greatest Altitude (each day).—Total prizes £1,015.
 6. Weight Carrying Competition (4 days).—Total prizes £555.
 7. Starting Competition (3 days).—Total prizes £305.
 8. Slowest Circuit (3 days).—Prize £100.
 9. Delivery of Despatches (3 days).—Total prizes £230.
 10. Prize for Competitors' Assistants.—Total prizes £130.
 11. Prizes for General Merit.—1st, £300; 2nd, £150; 3rd, £100.
- The "Lanark Trophy," presented by Professor Archibald Barr, D.Sc., President of the Scottish Aeronautical Society, will be given with the first prize.

No.	Com- petitor.	Nationality	Machine.		Engine (make).	No. of Cylinders.
			Type.	Maker.		
1	Ogilvie ...	B	Biplane ...	Wright Bros.	h.p.	
					40 E.N.V.	4
					40 Bollée	4
2	Barnes ...	B	Monoplane	Humber, Ltd.	40 Humber	4
3	Chavez ...	P	Monoplane	Blériot ...	50 Gnome	7
4	Vidart ...	F	Monoplane	Hanriot ...	40 Clerget	4
5	Champel ...	F	Biplane ...	Voisin ...	65 E.N.V.	8
6	Cattaneo ...	I	Monoplane	Blériot ...	50 Gnome	7
7	Tetard ...	F	Biplane ...	Sommer ...	50 Gnome	7
8	Blondeau ...	F	Biplane ...	Farman ...	50 Gnome	7
9	Gibbs ...	B	Biplane ...	Farman ...	50 Gnome	7
			Monoplane	Sommer ...	50 Gnome	7
10	Cockburn ...	B	Biplane ...	Farman ...	50 Gnome	7
11	Dickson ...	B	Biplane ...	Farman ...	50 Gnome	7
12	Gilmour ...	B	Monoplane	Blériot ...	35 J.A.P.	8
13	Radley ...	B	Monoplane	Blériot ...	50 Gnome	7
14	Cody ...	B	Biplane ...	Cody ...	50-60 Green	4
					65-80 E.N.V.	8
15	Audemars ...	S	Monoplane	Tellier ...	40 Panhard	4
			Monoplane	Demoiselle ...	35 Clement	2
16	Hanriot ...	F	Monoplane	Hanriot ...	40 Clerget	4
17	Colmore ...	B	Biplane ...	Short Bros.	50-60 Green	4
18	Grace ...	B	Biplane ...	Short Bros.	60 E.N.V.	8
			Monoplane	Blériot ...	50 Gnome	7
19	Edmond ...	F	Biplane ...	British & Colonial	60 Gnome	7
			Biplane ...	Aeroplane Co.	65-80 E.N.V.	8
20	Drexel ...	A	Monoplane	Blériot ...	50 Gnome	7
21	McArdle ...	B	Monoplane	Blériot ...	50 Gnome	7
22	Küller ...	D	Monoplane	Antoinette ...	65 E.N.V.	8

A = American; B = British; D = Dutch; F = French; I = Italian; P = Peruvian; S = Swiss.



The official recording board at the Lanark Flight Meeting.

The *Glasgow Herald* prize of £250 is to be awarded to the British aviator whose flights are the most meritorious, special regard being given to flights of a nature which indicate useful developments. The *Glasgow Evening News* prize of £100 is for the British aviator who makes fastest time round Tinto Hill and back—a course of some 15 miles.

Friday, August 5th.

After a week of practically continuous rain, Friday dawned bright, with but the gentlest of breezes from the west. Most of the flyers had arrived the day before, and the hangars were the scene of much activity during the day, some of the aviators hoping to make a few trial flights towards the evening. Dickson, Ogilvie and Cockburn had their machines erected by the evening, but unfortunately the wind veered round from south-west to north-west, and freshening considerably, made flying out of the question. During the day word was received from Barnes and Tetard that they would not be coming, but the only other entrant who had not arrived by the end of the day was Radley. Consternation reigned when the news came through that two machines belonging to Chavez and Kuller respectively had been totally destroyed by fire near Lancaster on their way north by special train. Chavez himself arrived during the day, and announced that he had secured a Farman, and had had further offers of two Blériots from Manchester, so that the clever Peruvian will be able later in the week to thrill the crowds with his altitude work. Kuller also hopes to be able to replace his Antoinette. Late in the evening a little excitement occurred in Audemars' hangar while the little *Demoiselle*, variously known as "The Angry Wasp" and the "Infuriated Grasshopper," was being tested. A back-fire resulted in a flame which caught one of the wings, but Mr. Cody, whose shed is adjoining, rushed in with an extinguisher in time to prevent any serious damage.

Saturday, August 6th.

The opening ceremony was performed this morning by the Lord Provost of Glasgow in the presence of a fair assemblage, and in his speech he made reference to the pioneer work of Pilcher, when as an assistant in the Glasgow University he commenced his famous gliding experiments at Cardross. Capt. Dickson gave the crowds

their first view of real flying at 1 o'clock, when he brought out his machine, and rising well, completed a couple of rounds. The wind was blowing about 16 miles an hour, and instead of making a third circuit he thought it wiser to descend as the machine dropped some 10 ft. at times as the wind varied. A long wait then ensued, during which time further trains from Glasgow brought the number of spectators up to about 20,000. Cody relieved the monotony by fetching out his 1½-ton biplane. He refused to enter for any particular event, as he only intended to make a run round the course on *terra firma*, his explanation being that he desired to get used to the machine with one engine before he fitted the twin set, which would give him 100-h.p. The huge machine, which, by the way, is too big for its hangar, was started after numerous attempts, the principal difficulty being to reach the propeller-blades to turn the engine—a chair, as on this occasion, is not always available or desirable. Despite its heavy build, Cody's machine should certainly fly when it has more power, and, with the one engine even, it left the ground for some little distance. Before he had returned from his circuit (which, by the way, according to the letter of the regulations, might qualify him for the £100 prize for the slowest circuit, these regulations apparently omitting to state the machine must be off the ground), the board announced that Blondeau and Cattaneo would come out. The former did not appear, but the Italian brought out his machine, and rose at about 3.30. His speed down the course was good, but the wind, which was about twelve miles an hour, retarded his progress on the return. He made only two rounds, however, before alighting. He explained that the following wind prevented a very clean rise, while away to the north a knoll produced a disconcerting upward current. At five Drexel came out, and immediately rising to a greater height than had been attained hitherto, completed four circuits. Dickson followed, making two rounds, came up to the hangar at a good height, made a sudden swoop, and recovering, alighted very cleanly. Rain now began to fall heavily, and at the same time the wind dropped. Unfortunately many of the spectators now began to leave the ground, and thereby missed the best flying of the day. Gilmour at about six made an exhibition flight once round the course, and was followed by Drexel, Cattaneo and Dickson, all of whom were in the air together,



The Hon. A. McInnes Shaw, Lord Provost of Glasgow, at the opening ceremony of the Lanark International Flight Meeting. The Lord Provost is standing in the centre of the group with the field glasses round his shoulders. Many well-known people who are now greatly interested in aviation will be noticed, including Mrs. Shaw, Sir Samuel and Lady Chisholm, Sir Wm. and Lady Bilsland, Sir James Crichton Browne, Sir Charles Bine-Renshaw, Sir Nathaniel Dunlop, Sir Simon and Lady MacDonald Lockhart, Col. R. C. MacKenzie, Dean of Guild Pearce Campbell, Mr. Thomas Wilson, M.P., Professors Archibald Barr and J. Harvard Biles, Mr. Hugh Reid, Provost MacLeay (Lanark), a large number of Magistrates and Town Councillors of Glasgow, officials, and the leading flyers, including Major Lindsay Lloyd, Mr. V. Ker-Seymer, Mr. S. F. Cody, Sig. Cattaneo, Mr. Robert J. Smith (the Secretary of the Scottish A.C. and of the Lanark Meeting), Mr. Harold E. Perrin (Secretary of the Royal Aero Club), Mr. A. V. Ebbelwhite, &c., &c.



A case of waiting, before the commencement of the flights at the Lanark Flight Meeting. From left to right Madame Champel, M. Champel and Sig. Cattaneo.

although at times out of sight in the mist. Cattaneo made a wide circuit by passing over the grand stand and across the Carlisle road, regaining the course at the east end. He also lost two rounds by passing twice inside a mark tower. Audemars also brought out his little Demoiselle, but after a flight of a few yards returned to his hangar. Dickson, after covering 12 miles, had to come down on account of a broken valve, but Drexel kept on for circuit after circuit high above his rivals, till he had covered nearly 62 miles.

Flying ceased at sunset, but in the fast-growing dusk Blondeau wheeled out his Farman, and with a passenger was soon making round after round. A descent to drop the passenger and take another, and he was up again, finally descending just before nine.

Altogether the first day was good, although it was to be regretted that many of the onlookers had departed before serious flying took

place. The course arrangements appear to be excellent, but the Press came in for harsh treatment till strong protests were raised. At first only a few Press representatives were to be admitted to the hangars, and when this right had been obtained a misguided official gave the police orders to clear the entire enclosure, irrespective of passes or badges. As a result several pressmen were roughly handled by a too officious inspector, and among those turned off was the proprietor of the *Glasgow Evening News*, a donor of a £100 prize, and a prominent guarantor. A magistrate, several friends of the aviators, and the representative of *FLIGHT* were also ignominiously expelled. Matters, however, were put right, and such a *contretemps* is not likely to occur again. Still, with the Bournemouth example, one would have thought that such unpleasantness would have been avoided.

The day's results were:—

Long Distance—

	Miles.	Yds.					Miles.	Yds.			
Drexel...	61	1,215	1	36	16½		Blondeau	26	550	—	46 34
Cattaneo	42	407	—	54	40½		Dickson	12	766	—	23 —

Aggregate Long Distance—

Drexel...	68	126	1	48	45½	Blondeau	26	550	—	46 34
Cattaneo	42	407	—	54	40½	Dickson	19	1,688	—	37 36

Speed—

Cattaneo, 9 miles 300 yards in 13 mins. 8½ secs.

Fastest lap, 2 mins. 4 secs. = 50.36 m.p.h.

Daily Flight Competition for Completed Laps.—1. Drexel, £25; 2. Cattaneo, £10.

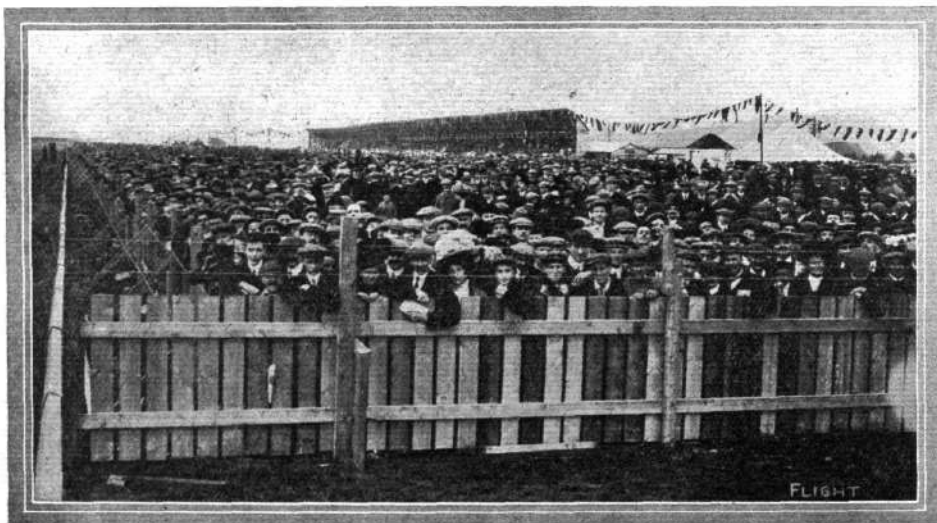
Speed Competition.—Cattaneo, £50.

Fastest Lap.—Cattaneo, £25.

Sunday, August 7th.

Weather conditions on Sunday were absolutely perfect. The sun shone brightly, and only the lightest of breezes from the north prevailed. Large numbers of people visited the course, and between four and five in the afternoon McArdle brought out his Blériot, and rising well, quickly went to a good height, and left the course in the direction of Tinto. Making a graceful sweep over the country-side, visible for several miles round, he returned to his hangar after an absence of about half an hour. Later in the day Edmond made a circuit on his Bristol biplane. Champel, Ogilvie, Grace, and Cockburn also made ascents during the day, the first-mentioned having a slight mishap.

A protest against Cattaneo's final flight on the preceding day was lodged, on the grounds that it was commenced after 7 p.m., the latest official hour at which flights may be started. Sunday saw the new Blériot arrive which Gibbs is lending to Chavez. The Hon. Alan Boyle's Avis is, we are informed, on its way, and will be flown by Colmore. Marcel Hanriot arrived during the day, and we hear from Gibbs that it is very unlikely that he will fly at Lanark;



General view of one of the popular enclosures at the Lanark Aviation Meeting on Saturday last, the opening day.

Radley is to fly his machines at the present meeting. It will be remembered that Gibbs was the actual aviator in the mysterious War Office experiments carried out in Glen Tilt, near Blair Atholl, three years ago. Lieut. Dunne, it appears, was the inventor of the machine, but Gibbs was the pilot, which makes him the first man to have flown in these Islands.

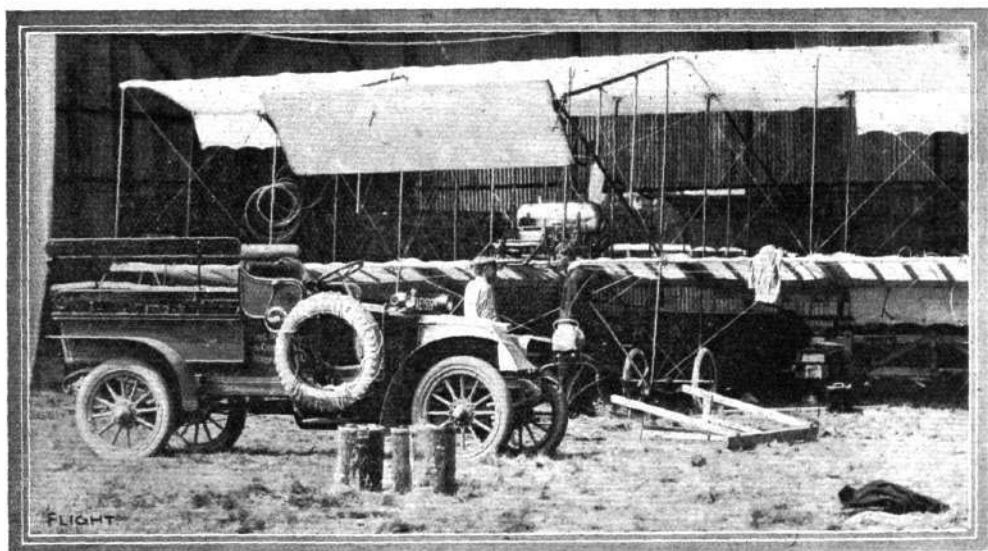
Monday, August 8th.

Some magnificent flights were made on this day, and incidents were plentiful, although the inadequacy of the board and imperfect communication made it very difficult to know exactly what was happening at any particular moment. The first competition of the day was the starting test, for which Cattaneo, Dickson, Cockburn, Ogilvie, McArdle, Grace, Radley, Audemars, Gilmour and Blondeau entered. The weather was perfect, the air being clear and the course bright with sunshine; while, most important of all, a dead calm reigned, and for the greater part of the day the wind was less than a mile per hour. McArdle, at the second attempt, rose, after a run of a little over 77 ft., a very creditable performance, considering that Gilmour, who was second, ran 104 ft. 2 ins. before rising; Radley came third, some 5 ft. behind. McArdle, therefore, wins the daily prize of £20. All three machines were Blériots, and the monoplane certainly has an advantage over the biplane in quick rising. The Demoiselle, which was rather fancied, had engine trouble, but the short flights it has made show that it is an exceptionally quick riser, and has a great turn of speed. Cattaneo, Dickson, Radley, and Grace competed in the five lap speed event, but their performances were nothing out of the way, and it was in the long distance flights that the first serious mishap of the meeting occurred. Blondeau was seen to be in difficulties, and flying low over the rough ground beyond the plantation at the northern end of the course, and presently it was obvious that he was endeavouring to find a place to alight, and also that his Farman was not under proper control. It appears that his lever stuck, and at a critical moment the wire broke, and he decided that to take the 30 ft. drop was the safest course. He accordingly shut off his engine; the machine fell, turning a half somersault, but Blondeau jumped out of the ruins unhurt. Examination showed that the lower plane was wrecked, the propeller in splinters, the stays broken and twisted, and the engine damaged. Champel made a very good show with his Voisin in the duration flight, but owing to his misjudging the starting line it is doubtful whether his performance will count. Cattaneo on his second long flight was seen to alight, and at first it was feared that he was in trouble, but it transpired that he had merely run out of petrol. The cross-country flight brought out Dickson and McArdle. The point selected was near Dunsive, giving a course of 11½ miles, which Dickson successfully negotiated at an average of 25 miles an hour. McArdle, however, instead of turning, headed away to the north,



Audemars, Kuller and Cattaneo (from left to right) waiting for the wind to abate at the Lanark Flight Meeting.

and soon his white-winged Blériot was lost to sight. As time passed some little anxiety was felt, but later a message by 'phone was received from the daring flyer himself. He had continued his journey in the direction of Edinburgh, but a fog rendered a descent necessary, only a mile out of the historic capital. No damage was done to the machine, and later in the evening McArdle returned by car with his machine in tow. The news that the aviator had all but succeeded in reaching the Scottish capital brought home to the spectators, perhaps, more than anything hitherto the stage to which the aeroplane has already attained. Dickson and Drexel entered their biplane and monoplane in the weight carrying contest during the afternoon, but both drew blank. Dickson attempted to carry a passenger of some 14 stone, and to preserve his fore and aft trim, had weighted the front of the machine with sheet lead. The machine rose slowly, and kept low, till at last it came down on



Getting the Bristol biplane of the British and Colonial Aeroplane Co. ready for M. Edmonds, who is in charge of this machine, at the Lanark Flight Meeting.

rough ground, throwing out the occupants, who were, however, unhurt. The propeller was smashed, but otherwise no serious injury was done. Drexel had to come to earth even sooner, but luckily the ground was smooth. The next excitement, and indeed the event of the day, was the attempt by Chavez to improve upon his own altitude record made at Blackpool. The machine was a new Blériot belonging to Gibbs, which Radley had been using. Rising in great circles ever narrowing, he at last disappeared in a cloudbank, from which he emerged only to be lost to sight once more. At the point where he entered the clouds the theodolites gave the altitude as 5,250 ft., but it was apparent that he had gone considerably higher. Presently the speck grew larger, and as details became discernible it could be seen that he was making a characteristic *vol plane*. The angle at which he descended was rather disconcerting to those who saw this method of descent for the first time. At about 2,000 ft. a puff of smoke indicated that he had started his engine, and finally he alighted gently within a few hundred yards of the starting-point. He was dripping with moisture from the clouds, and received a great ovation, among the first to congratulate him being the Lord Provost of Glasgow and Professor Barr. He carried two barographs, one slung round his neck, but they showed different readings, the maximum being over 6,000 ft. Of course, Lanark Moor stands 700 ft. above sea level, so that the flyer has a handsome start. Chavez's masterly, indeed artistic, handling of the dainty Blériot undoubtedly entitles him to rank as a foremost exponent of this type of machine.

Drexel had an attempt at altitude, but came down after 854 ft. Grace also prepared to start with his Farman, but was prevented by an incident which will give those who saw it a disinclination to stand in line with a revolving propeller in the future. The propeller drew up a mechanic's knife lying on the ground, and a flash of something white indicated that something had happened.

On stopping the engine it was found that a semicircular piece had been taken out of the tip of one of the propeller blades. Search revealed the remains of a pocket knife which, had it struck anyone in its flight, would have assuredly inflicted a fatal injury. Grace was for cutting out a piece from the other blade to balance the thrust, but the general opinion was that it would be too dangerous, Mr. Chereau being of the opinion that the blade would crack to the boss if used.

The following are to-day's official results:—

Daily Duration Prize.

	h. m. s.	£		h. m. s.
1. Cattaneo ...	3 19 9½	25	4. Blondeau ...	0 31 42½
2. Drexel ...	1 27 13	10	5. Grace ...	0 31 7
3. Champel ...	0 54 2		6. Cockburn ...	0 11 20½
(Alleged false start.)			7. Ogilvie ...	0 10 31½

Aggregate Duration to Date.

	h. m. s.		h. m. s.
1. Cattaneo ...	4 12 39½	5. Grace ...	0 31 7
2. Drexel ...	2 11 39½	6. Dickson ...	0 28 9½
3. Blondeau ...	1 14 42½	7. Cockburn ...	0 11 20½
4. Champel ...	0 54 2	8. Ogilvie ...	0 10 41½

Aggregate Distance to Date.

	Miles.	Yards.		Miles.	Yards.
1. Cattaneo ...	193	1,224	5. Champel ...	32	1,147
2. Drexel ...	130	737	6. Grace ...	20	1,236
3. Blondeau ...	47	741	7. Cockburn ...	6	1,563
4. Dickson ...	42	808	8. Ogilvie ...	5	1,414

Longest Single Flight to Date.

	Miles.	Yards.		Miles.	Yards.
1. Cattaneo ...	89	118	5. Grace ...	16	1,659
2. Drexel ...	61	1,215	6. Dickson ...	12	700
3. Champel ...	32	1,147	7. Cockburn ...	6	1,563
4. Blondeau ...	26	550	8. Ogilvie ...	5	1,414

Speed Competition (5 Laps).

	m. s.		m. s.
1. Radley ...	9 41½	3. Grace ...	14 4½
2. Cattaneo ...	10 41	4. Dickson ...	14 39½

Fastest Laps.

	m. s.		m. s.
1. Radley ...	1 47½	3. Grace ...	2 37
2. Cattaneo ...	1 59	4. Dickson ...	2 42½

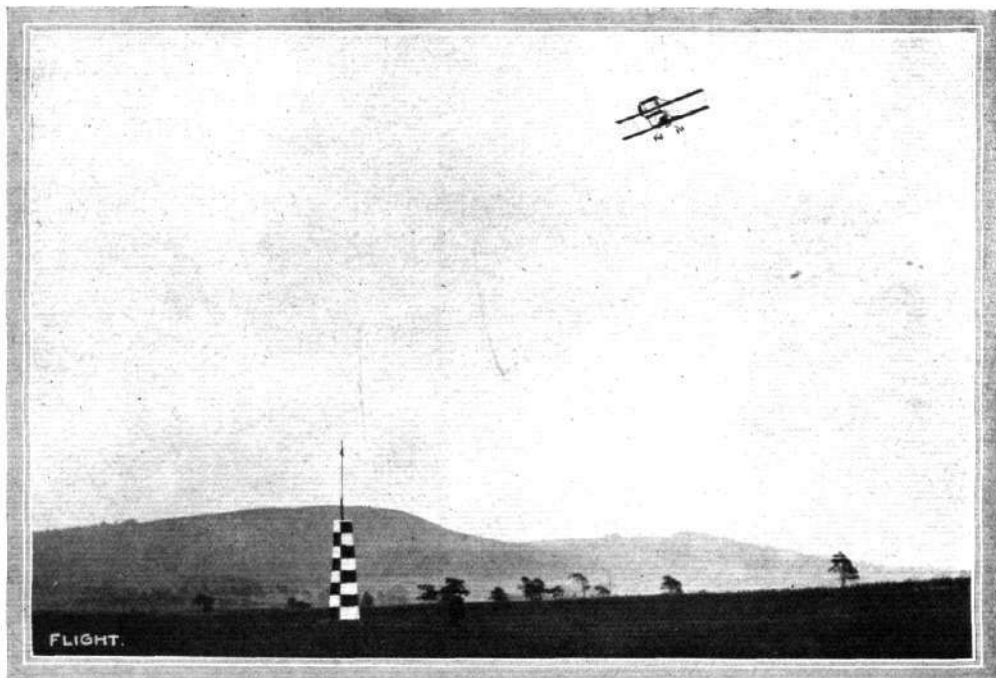
Daily Prizes (5 laps).—1. Radley, £50; 2. Cattaneo, £30;

3. Grace, £15.

Fastest Laps.—1. Radley, £25.

Fastest Laps (Monoplanes).—1. Radley, £25.

Fastest Laps (Biplanes).—1. Grace, £25.



Captain Dickson, on his Henry Farman, making the opening flight at the Lanark International Flight Meeting on Saturday last, Rounding one of the mark towers.



Major Kennedy and Mr. Hogarth taking Drexel's altitude at Lanark Meeting.

Tuesday, August 9th.

The fine performances of the previous day produced a record gate on Tuesday, but, as fate would have it, the conditions were not particularly good although the weather was perfect. The wind varied considerably, and was rather gusty, so that the flyers only went up at long intervals. The day's competitions included the delivery of despatches, speed and slow events. For the first Grace and Ogilvie turned out. The despatch consisted of an orange, and the point of delivery was a circle of 12 ft. diameter. The difficulties at present of this type of competition may be judged by the fact that Grace, who was easily first in delivering his "despatch," got no nearer than 23 ft. 10 ins. of the circle, whilst Ogilvie could not do better than 62 ft. Difficulties would multiply ten times when the discharge has to be made from any appreciable height, a condition which is obviously the only practical form in which bomb throwing can be of any use. Already a special foot-worked valve for the hurling of these missiles is suggested. The slowest circuit fell to Grace, who covered the $1\frac{1}{2}$ miles in 3 mins. 17 secs. Drexel came out to please the crowd, and went aloft at about 5 p.m. He flew fairly high, and took the corners sharply, canting over in good style. Before alighting he gave an excellent exhibition of skilful handling in making several small circles, with his Blériot lying over at quite an alarming angle. In descending he made a fine though short *vol plane*, switching on his engine when close to the ground, and running up to the hangars at a pace which scattered the crowd in all directions. Cody during the afternoon made his usual tour of the course, and stuck in his favourite place, which necessitates considerable assistance before the machine can be wheeled back. For a few hundred yards down the straight the big biplane really flew 6 to 8 feet in the air, and gave signs of excellent flying qualities were it not so very much underpowered. Drexel and Radley later made attempts for the speed prizes, and the former averaged 37.87 m.p.h., his fastest lap being 2 mins. 20 secs. (42.77 m.p.h.), his total time being 13 mins. 41½ secs. Radley on the new Blériot averaged 55.05 m.p.h. over the five laps (equal to 8 miles 1,300 yds.), covering one lap in 1 min. 50½ secs., equal to 56.36 m.p.h., the fastest of the day; total time, 10 mins. 6½ secs. Kuller is building his Antoinette, but is still awaiting a few engine parts. He will probably be able to put in his official appearance to-morrow or Thursday.

Perhaps the excitement of the day was the announcement that McArdle had lost his pocket-book on the grounds, containing his pilot's certificate, some photographs, and a matter of £300.

In the evening the breeze dropped considerably, and enabled some general flying to be indulged in. Drexel, in the height competition, went up to 4,276 ft., and the loud cheering which greeted his descent to *terra firma* testified to the spectators' taste for such exhibitions. Vidart also rose on his Hanriot machine, but could not get his engine to run properly and so came down again. Then Cattaneo went up to 3,230 ft., to be followed by Grace, who reached 2,480 ft. Radley made a trial over the cross-country course, and covered the 22½ miles in 26 minutes. The following were the results:—

Speed Competition (5 Laps).

	m. s.		m. s.
1. Radley	... 10 6½	3. Drexel	... 13 41½
2. Cattaneo	... 10 40		

Fastest Laps.

	m. s.		m. s.
1. Radley...	... 1 50½	3. Drexel	... 2 20
2. Cattaneo	... 1 58	4. Grace	... 2 32½

Height Competition.

1. Drexel	... 4,276 ft.	3. Grace	... 2,480 ft.
2. Cattaneo	... 3,230 "	4. Vidart	... 1,300 "

Slowest Circuit.

	m. s.		m. s.
1. Edmond	... 3 31½	2. Grace	... 3 17

Daily Prizes (5 Laps).—1. Radley, £50; 2. Cattaneo, £30; 3. Drexel, £15.

Fastest Lap (Monoplane).—1. Radley, £25.

Fastest Lap (Biplane).—1. Grace, £25.

Height.—1. Drexel, £20.

The number of spectators during the day were calculated at a trifle over 20,000.

Wednesday, August 10th.

With practically no wind, and the sun shining brilliantly soon after daybreak, great hopes were entertained that the fourth day of the meeting would produce some good flying, and the promise was amply fulfilled. Enormous crowds wended their way to the aerodrome, and a record "gate" of round about 50,000 was the result. The first in the air was Vidart, who got up to a height of 400 ft., and in the course of a 10-minute trip, flew towards the town. Several of the aviators made attempts in the altitude competition, but none of them got very high. Drexel went up to 1,400 ft., while Cattaneo was satisfied with 300 ft. The starting competition also took up a good deal of time, but this did not prove very attractive to the general spectators. Radley made the best start, getting off in 107 ft., and McArdle was second with 108.9 ft. Drexel tried with a passenger on board, and then he travelled 243.8 ft. before rising, while Grace, who made an attempt under the same conditions, could not get off in less than 367.97 ft.

Young Marcel Hanriot had his monoplane out for a trial, and succeeded in making a couple of rounds of the course. Audemars was also out on his Tellier, but at the end of his flight he came down very heavily and broke the chassis of his machine. In the speed contest Cattaneo got in front and completed the five laps at a speed of 56.27 m.p.h., while his speed on his fastest lap was 56.46 m.p.h. Later, however, the figures were improved upon by Radley, whose speed was over 58 m.p.h.

BLACKPOOL FLYING CARNIVAL—continued.

By OUR SPECIAL COMMISSIONER.

Wednesday, August 3rd.

THE first part of the Blackpool Flying Carnival concluded to-day, the weather being ideal. During the morning Grahame-White's daring flight on the previous evening and the possibility of Loraine's flight to Douglas were eagerly discussed by those more intimately connected with the machines. The majority of the machines were ready, Grace's Blériot and Roe's triplane having been refitted. The latter machine was the first to make its appearance on the flying ground about three o'clock, and Roe was announced as a competitor for the duration prize. Some little trouble ensued in getting the engine started, but this was managed, and the machine started along the ground, covering about half the course before lifting. Keeping very low, Roe succeeded in making two circuits, and then came down rather heavily, damaging the axle of a pair of suspension-wheels. During the meeting Grahame-White has been demonstrating the value of the aeroplane from the military point of view, and it was in connection with this that he made his first flight. England having been invaded by an enemy, a brigade of British infantry was supposed to have been cut off and surrounded at the Club House, necessitating the carrying of despatches to the headquarters of the Commander-in-Chief of the British forces at Lytham Hall, four miles away. In accordance with the pre-arranged plan Grahame-White travelled across the ground to the Club House, receiving there the despatches. Rising rapidly he made a straight course for Lytham Hall and was soon lost to view.

As Grahame-White was leaving, Tetard came out on his Sommer biplane and began circling the aerodrome at a very low altitude.

Grahame-White presently returned and set off again with other despatches, taking with him a photographer for the purpose of photographing the intervening country.

Some little time afterwards, the Blériot machine of Chavez was hauled into the aerodrome, and it was taken for granted by the crowd that Chavez was going for the Altitude Prize. Such proved to be the case, and speculation became rife as to the height he would attain. Carrying the sealed barograph suspended from his neck, Chavez gave the signal for his mechanics to let go, and making a short get-off rose rapidly above the aerodrome, flying in wide circles. It was soon obvious that his previous altitude of 2,550 ft. which he made on Monday would be beaten, and after some minutes the possibility of the world's record being broken was mooted. Rising steadily he reached his highest point in about a quarter of an hour, and then began to descend. His descent was

a far finer spectacle than his ascent, consisting of a series of magnificent *rolls plane*, the machine diving downwards at an angle of 40° to 50°. He reached the ground after a flight of 24 minutes, complaining of the cold he had experienced, and also mentioning the difficulty he had in locating the aerodrome from above. The barograph recorded 1,800 metres, and after correction the height was given as 5,887½ ft., thus breaking the record with the exception of Brookins' Atlantic City flight of 6,175 ft., and superseding Tyck's made on Bank Holiday at Brussels. Chavez had to repeatedly acknowledge the applause of the crowd on passing out of the aerodrome. Drexel, on the Blériot two-seater, followed Chavez, being announced as entering for the Altitude Prize, but was evidently deterred on hearing the height Chavez had attained. Instead of going for the Altitude Prize Drexel gave a magnificent exhibition of flying, handling his machine with consummate ease and grace, carrying out a series of evolutions to the delight and admiration of the spectators. Loraine's Henry Farman machine was wheeled into the aerodrome whilst Drexel was flying, but trouble with the tail caused the aviator to come down after a very short flight.

Having finished the despatch carrying, Grahame-White turned out for the Duration Prize, flying well within the limits of the aerodrome. As Grahame-White finished, Drexel again went up, and it was evident that the Duration Prizes would be won by these two. About five o'clock Roe, who had made two attempts previously, started again and succeeded in getting off the ground much quicker than before. In turning at one of the mark towers, however, he was caught by the wind and headed straight for the mark tower. To avoid it he brought the machine down suddenly on its nose, breaking several struts, the propeller, and one section of the planes. Roe himself seemed none the worse for the sudden descent. After more flying by Grahame-White and Drexel, Grace came out just after 6 o'clock for a trial spin. He got off the ground in fine style, but as soon as he rose began to turn, just clearing the Club-House, the machine having a definite list. Clearing the buildings, he made another circuit, and then began to descend, switching off his engine, but the list became so great that he started the engine again when near the ground, coming down heavily on one wheel, which buckled, then lifting again, and finishing by coming over on the buckled wheel, breaking the landing-chassis, propeller, and one wing, but escaping injury to himself. Grace stated that the unusual behaviour of the machine was caused by the faulty adjustment of the two halves of the main plane. About 7 o'clock rain began to



Comrades in flight at Blackpool Aviation Meeting, waiting for the wind to drop. From left to right: Messrs. Champel, McArdle, Grahame-White, Cattaneo, and Drexel. Behind, Messrs. Duray and Chavez.



Chavez reading the barograph after making his high flight of 5,887½ ft. on his Blériot at Blackpool.

fall and the wind freshened, the people making their way homewards. At this time Grahame-White had been in the air 1h. 44m. 44s., whilst Drexel's time was 1h. 31m. 46s. The difference was so little that Drexel came out at 7.30 p.m. to make sure of the first prize, and began flying round the ground. Grahame-White was not to be beaten, and four minutes later he had his machine back again in the aerodrome, going up after Drexel. A few minutes before 8 o'clock Tetard also came out, and three machines were in the air together. When the day closed at 8 p.m. both Grahame-White and Drexel were still flying, their times being 2h. 3m. 24s. and 1h. 54m. 26s. respectively. The awards for the day were as follows:—



Chavez handing over the barograph to Mr. Harry Delacombe after his British record high flight at Blackpool.

£100 duration prize to Grahame-White ... Time, 2h. 3m. 24s.
 £50 duration prize to Drexel ... Time, 1h. 54m. 26s.
 £50 altitude prize to Chavez ... Height, 5,887½ ft.
 £100 merit prize to Chavez for his British record high flight.
 The total prizes gained during the week's meeting are:—

Mr. Grahame-White	£650	Mr. Loraine	£75
M. Chavez	225	Mr. Roc	50
Mr. Drexel	175		



Tetard, one of the Hyers who did well at the Blackpool Aviation Meeting last week.



Claude Grahame-White, at Blackpool aerodrome, just about to start for a flight on his Henry Farman, with Miss Florence Parbury, the authoress, as passenger.



A. V. Roe starting, on his triplane, for a flight at Blackpool Aerodrome. Inset he is seen in full flight round the course.

In addition, Mr. Grahame-White won the cup offered by the *Daily Telegraph*, M. Chavez the cup given by the Lancashire Aero Club, while a special cup, given by the Lancashire Aero Club, was awarded to Mr. Drexel. The special merit prize of £50 awarded to Mr. Roe was given by Sir Peter Walker.

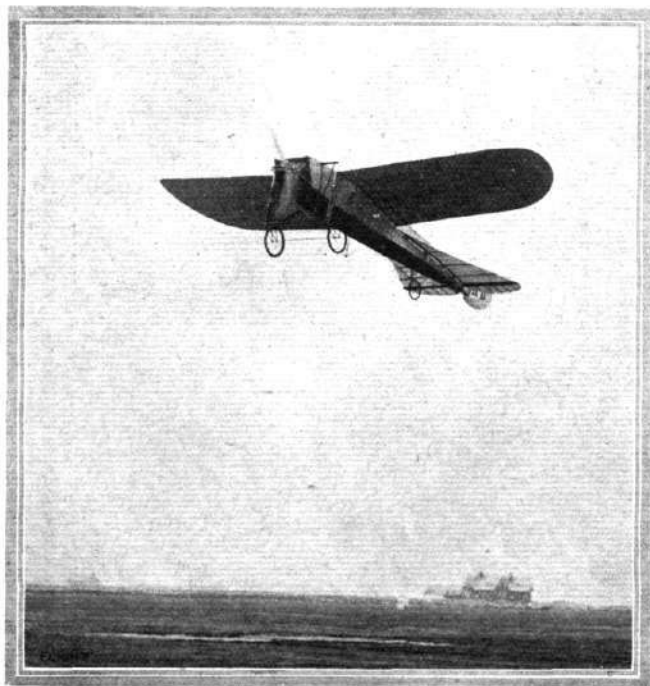
EXHIBITION FLIGHTS AT BLACKPOOL.

FROM the 4th until to-day (Saturday), exhibition flights have been given by Grahame-White, who has been specially engaged at a fee of £2,000. In addition M. Tetard was engaged to give flights. To encourage attendance at the aerodrome each spectator obtains a numbered ticket on passing through the turnstile, which he retains. During the evening numbers are posted up round the ground, and the persons having tickets so numbered become entitled to a flight with Grahame-White or Tetard. The proportion of flight tickets given is about one to five hundred persons. On Thursday afternoon, although the wind was troublesome, Grahame-White and Tetard made several flights, both with and without passengers, from four o'clock to eight o'clock. The greatest interest was aroused by Harding's attempt for his pilot's certificate on the J.A.P. monoplane. Harding's position was rather singular. He put in the necessary qualifying flights for his certificate, and forwarded to the Aero Club of France the customary application for the certificate. Owing to some blundering this was not granted to him, and as a consequence he was not allowed to fly in the aerodrome whilst flights were in progress. I am given to understand, however, that the granting of his certificate is now under consideration by the Aero Club of France. Harding, after some trial spins, started out for 3 laps of the course as his first qualifying flight, but had to come down after completing 2½ laps owing to engine troubles. Friday and Saturday were blank days as regards flight, the small number of people who attended having to be content with the inspection of the machines in the hangars. The Blackburn monoplane which arrived on Thursday became the centre of interest. It resembles an Antoinette in general outline, but differing greatly in control and details. Sunday witnessed some very fine flying by Tetard, who twice made flights over the town, rounding the Tower *en route* and coming back over the sands. In the aerodrome Tetard gave some passenger carrying exhibitions, whilst Roe and Harding put in some short flights. The weather on Monday was ideal for flying, and the attendance fairly good when Roe turned out about three o'clock. He had a new propeller fitted

with a larger diameter and a smaller pitch, and got off the ground very rapidly, flying two or three laps before bringing the machine to earth again. A minute or two later he was off again with one of his assistants as passenger, but only succeeded in flying half a lap. Tetard was next out, and flew several laps at a low altitude. In fact, one of the features of the meeting has been the low flying put up by Tetard, and Harding succeeded in doing two rounds in fine style. Until six o'clock Roe and Tetard shared the flying, but at that time Grahame-White's machine was brought out, having been reassembled after his trip to Newcastle. In crossing the hangar enclosure a curious incident occurred. A small stone being thrown up by one of the wheels, and catching the propeller, broke a piece almost a foot long off the edge. This necessitated taking the machine back to the hangar. A quarter of an hour later Grahame-White came out on the British built Henry Farman machine, and began flying in wide circles round the aerodrome, and after more flying by Tetard and Grahame-White the day's flying ended.

Tuesday was a glorious day, but with the anemometer registering over 20 miles per hour at 3 o'clock, flying seemed doubtful. Just before 4 o'clock, however, Grahame-White created a diversion by flying over the fences into the aerodrome, having risen in the enclosure hangar. The wind was still strong, and after flying for 10 minutes he descended. Roe was next in evidence with a series of short flights, followed by Tetard, who also found the wind troublesome and was not up long. Grahame-White then gave another short exhibition, and after he came down the entertainment was provided entirely by Roe during the rest of the afternoon with a series of short passenger-carrying flights. In making a solo flight just after 6 o'clock, Roe came down the centre of the aerodrome with the wind at his back, flying rather low and fast. In attempting to turn against the wind, one pair of wheels struck the ground in a very bad patch, with the result that the machine turned completely over on to its back.

The wind having dropped, Grahame-White and Tetard occupied the evening with passenger-carrying flights, executing various manoeuvres and *vol plans* to the great delight of the crowd numbering about 5,000. Details of Wednesday's flights will be found on p. 649.



Drexel flying at Blackpool on the two-seater Biériot, with Cecil Grace as passenger.

A MODEL FARMAN AT A COST OF LESS THAN 7s.

By J. F. MILLER.

THE following details of a model Farman biplane constructed by myself at a total cost of under 7s., will, I feel sure, prove interesting to many readers of FLIGHT, more especially to those who prefer to build their own machines.

The model is practically an exact copy of a 1909 Henry Farman; Fig. 1 shows the plan. The whole of the woodwork is of spruce, the outriggers being of round section and the struts of the main planes and tail, and those upon which the skids are mounted being oval in section.

All joints in the framework are made by pointing the ends of the struts, B, and fixing the points into holes bored in the spars, C, by means of a fine drill and bracing the whole together with wire, W, as shown in Fig. 2. In order to prevent the bracing-wire cutting the wood, saddles made of copper wire are placed at A, Fig. 3. This method of construction obviates the use of lugs, thereby economising weight. The weight of the model is about 14 ozs. The ribs of the planes are pinned and bound to the spars, as shown in Fig. 3; a, shows the ribs before binding, and b, after the wire has been applied.

The wheels are plain Cochrane aluminium, mounted as on the full-sized Farman, except that the rubber bands are fixed in a somewhat more simple manner, as shown in Fig. 4.

The back wheels are fixed by making one of the tail-plane spars slightly longer than the width of the tail. A hole is bored at each end of this spar to form guides for the wheel-supports. Small spiral springs are used in connection with these as shock absorbers. The arrangement is clearly shown in Fig. 6.

The rudders are worked by means of a small wire at the back of the machine.

The elevator-lever is held in any desired position by means of the wire and spring, shown in Fig. 5.

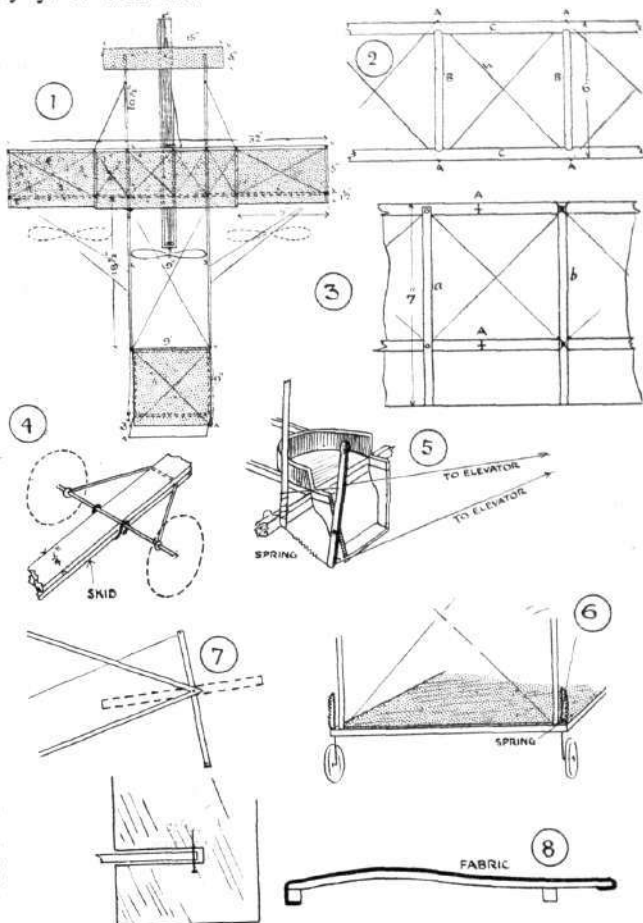
The span of the main-planes is 32 ins., and the overall length of this model 46 ins. Other principal dimensions are shown in the accompanying sketches.

The tail is larger than if built to scale, as this is generally found necessary in models. The elevator, Fig. 7, is made of solid wood to give extra weight in front in order to balance the tail and its long outriggers.

The main-planes and tail are surfaced in the following manner: A piece of light calico is cut to the required shape, but rather larger than the actual dimensions of the finished planes. The front edge of this is glued to the under-side of the main spar. The calico is then carried across the top of the plane, and the rear edge glued in position underneath the rear edge. The sides are also stretched tight and the edges glued, Fig. 8.

The whole when dry is washed over with a solution of gelatine. This both airproofs and tightens the fabric. The elevation of the machine is that given in FLIGHT, No. 24.

Since completing this machine I have fixed two propellers, as shown by the dotted lines in Fig. 1.



THE MILLER MODEL FARMAN BIPLANE.—Sketches of details of construction. 1. Plan and principal dimensions. 2. Diagram of the framework bracing. 3. Diagram of the bracing of the planes. 4. Arrangement of the chassis wheels and skids. 5. Arrangement of the control. 6. The trailing wheels under the tail. 7. The elevator fixing. 8. How the fabric is fastened.

MR. GRAHAME-WHITE FLIES AT NEWCASTLE.

IN connection with the Lifeboat Demonstration at Newcastle on Saturday, Mr. Claude Grahame-White paid a visit to Gosforth Park in order to give some exhibition flights. A strong wind blew all day, and few people anticipated that any flying would be possible, but at half past four Mr. White had his machine brought out and succeeded in getting into the air. Rising to a height of about 50 ft., he made two circuits of the course, but the machine was buffeted about a good deal by the wind. Subsequently he made a couple of short flights in front of the grand stands.

In the evening Mr. Grahame-White was entertained at supper by the members of the Pen and Palette Club.

Newcastle Meeting Abandoned.

THE organising committee have decided to abandon the idea of holding a flying week at Gosforth Park next month. Although the guarantee fund of £3,000 originally asked for would probably have

MR. GRAHAM'S GILMOUR AT HUNTLY.

IN connection with a cattle show at Huntly, Mr. Graham Gilmour took his Blériot monoplane there on Thursday of last week. The morning was spent in fitting up the machine. A 25-mile wind prevented any flying before eight o'clock, by which time a good many of the spectators, who had waited patiently all the afternoon, had gone home disappointed. However, there were still about 2,000 present, and they encouraged the aviator with a rousing cheer when, after a preliminary run along the ground, he rose in the air. Flying in a circular direction, Mr. Gilmour covered a distance of about half a mile and then landed in a stubble field, 200 yards away from his starting place.

been exceeded, the cost of levelling the flying track, &c., in order to ensure the safety of the flyers and spectators would have more than trebled the cost of the ground as originally contemplated. Under these circumstances it was felt that the financial prospects did not justify the holding of the meeting.

THE BLACKBURN HEAVY TYPE MONOPLANE.

THE accompanying photographs illustrate a monoplane that has been constructed by Messrs. Blackburn Aeroplanes at their Leeds works. It is what they call their "heavy type," as every effort has been made to secure substantial construction rather than light weight. It will be observed that the pilot's seat consists of a wicker chair placed on the platform of a car that is suspended at some considerable distance below the planes. The car is supported upon a three-wheeled chassis, of which the suspension forms one of the special features of the construction. The front wheels are mounted

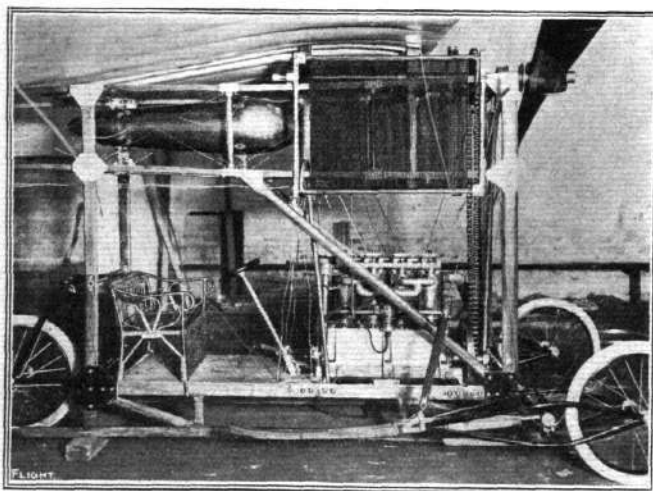
being pivoted at I, this movement slightly acts on the control wire, E, which warps the main planes, therefore simultaneously with turning, the planes are slightly warped. To warp the planes more



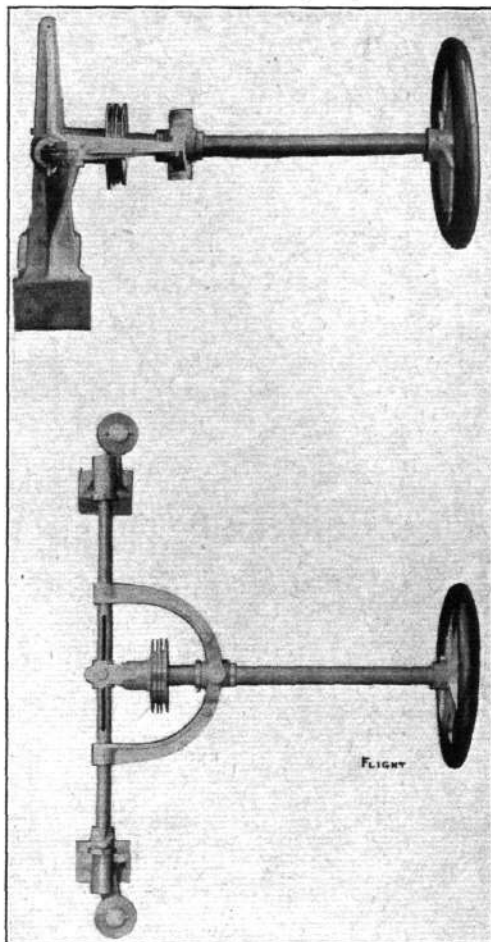
Front and side views of the Blackburn heavy type monoplane.

on cantilevers, the tail ends of which form skids. Elastic springs are used, and if the shock of landing is very severe the skids come into direct contact with the ground. In front of the pilot is an inclined steering wheel very much on the lines of that on a motor car. This wheel effects all controls, for the steering column is pivoted so that a movement to the right or left warps the planes for lateral stability, while a to and fro motion operates the elevator. The steering is effected by turning the wheel which moves the rudder.

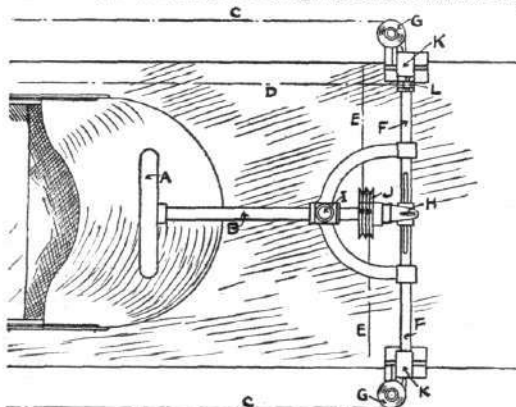
The wires, C, in the sketch, are connected round the pulleys, G, through the hollow tube, F, to the pin, H, so that a movement to right or left of hand-wheel, A, and column, B, pulls the wire, C, which is connected to the rudder, for steering. The column, B,



View of the car beneath the planes on the Blackburn heavy type monoplane.



Two views of the Blackburn aeroplane control mechanism.



Diagrammatic sketch of the Blackburn aeroplane control.

or independently of other movements, the wheel, A, is turned, whereby the wire, E, is wound round the pulley, J.

Depressing or elevating the wheel, A, and column, B, turns the hollow tube, F, which is supported in bearings, K, and which also has a fixed two-armed lever, L, attached to it. From the two-armed lever, L, to the elevator are connected the elevator wires, D.

The control of the three movements can act simultaneously or independently.

The engine is placed on the car in front of the steering column, which still further carries out the motor car idea, and the propeller, which is mounted overhead, is driven by a long chain.



THE WILLOWS AIRSHIP VOYAGE FROM CARDIFF TO LONDON.

A NEW record in British aeronautics was set up in the small hours of Sunday morning last, when Mr. E. T. Willows, in his little airship, successfully completed a voyage from Cardiff to London, thus making another important notch in British aeronautical progress. Leaving his shed on the East Moors, Cardiff, a few minutes after eight on Saturday evening, Mr. Willows shaped a course for the Bristol Channel and Clevedon, the first 14 miles of the journey to this point being covered in about half an hour. Bristol was reached at half-past nine, and from there the journey was continued over Chippenham, Calne, Marlborough, Hungerford, Newbury, Reading and Chertsey.

About a dozen times on the way Mr. Willows brought his machine down to a height of about 600 ft., and by means of a megaphone enquired his whereabouts. During the night he steered by the lights of the towns, keeping very high, the barograph reading 2,800 ft. while crossing Reading. Just before reaching his projected destination at the Crystal Palace Mr. Willows threw out his grappling-iron, and it caught in a tree; but the rope broke. This left him with his trail-rope to rely upon. It was about twenty minutes to six when he passed over the Palace, but owing to the loss of the grappling-iron he did not attempt a descent. He continued on to Lee, where the trail-rope was caught by a watchman, who secured other help, and assisted Mr. Willows to bring his airship to earth. For the first portion of the journey Mr. Willows was guided by the lights of his father's motor car, but this beacon-light failed him before Clevedon was reached, the car being stranded, and thereafter the pilot was left to his own resources, steering by the stars and the lights of the towns, verified occasionally by a megaphoned enquiry to the people below. The distance covered was about 140 miles, and the time taken a little under 10 hours.

On Monday a supply of hydrogen arrived, and after the envelope had been replenished Mr. Willows rose from Lee and sailed over to the Crystal Palace, taking about 18 mins. to cover the intervening five miles. He hopes to make a series of trips from the Palace grounds.

The "Willows II" is of the non-rigid type, and was described in these pages on February 12th last, while further photos also appeared in our issue of July 2nd. The envelope is 82 ft. in length and 20 ft. in diameter. Two Handley-Page propellers, 6 ft. in diameter, are driven by a 35-h.p. 8-cyl. air-cooled J.A.P. engine, and they are so mounted that they can be turned in order to assist the airship in ascending or descending. The envelope was inflated by hydrogen supplied by the Knowles Oxygen Co., Ltd., of Wolverhampton, and during the trip the motor was driven by Shell motor spirit.

On Tuesday Mr. Willows rose from the Palace grounds and manoeuvred over the cycle track for about ten minutes, when, in view of the strong wind, he deemed it prudent to descend.

Mr. Willows is now having a new envelope made, and when that is ready, in a few weeks' time, he intends to try to sail from London



Mr. Barnes at Lofthouse.

ON the 1st inst. Mr. G. A. Barnes visited Lofthouse Park, and made four flights on his Humber monoplane before a crowd of about 15,000 people, mostly drawn from the Leeds and Wakefield districts. The aerodrome was not of the best, as the surface of the ground was very rough, but Mr. Barnes succeeded in making three trials, each of a quarter of a mile in length, and on the fourth he flew a much greater distance and at a good height.

Curtiss and Hamilton at Loggerheads.

GLENN CURTISS and Hamilton, who have done so much to stir up interest in aviation in the United States recently, are now involved in law-suits, the former claiming from the latter \$6,000, being royalties at the rate of 60 per cent. on certain money which Hamilton has received for giving flights on the Curtiss machine

A cruciform tail of the Santos Dumont type is fitted at the rear end of the main girder, while just in front of this member there is another horizontal plane.

The following are the principal dimensions:—Span of main plane, 30 ft.; length overall, 26 ft.; supporting surface, 170 sq. ft.

Weight.—800 lbs.

Motor.—35-40-h.p., water-cooled.

Propeller.—Two-bladed wooden, 8 ft. 6 in. diameter; reduction of 2 to 1.

Speed.—60 miles per hour.

to Paris by night. In the meantime, he will also adapt the framework of the car to carry a mechanic to look after the engine while he attends to the steering gear. We wish him a full measure of success.



Mr. E. T. Willows, who, starting on Saturday evening, sailed with his airship from Cardiff to London, landing at Woodman Farm, between Lee and Eltham, early on Sunday morning, after covering a distance of about 150 miles. Mr. Willows is in the pilot's seat of the airship car.



which won the Gordon-Bennett contest last year. Hamilton is said to have been annoyed because of certain trouble with the engine. He therefore refused to fly the machine again.

A Correction.

IN our account of the flying at Brooklands on Bank Holiday, it was mentioned that Mr. L. D. Gibbs was out on his machine. As a matter of fact, however, the flights were made by one of his pupils, whom our correspondent mistook for Mr. Gibbs, Mr. Gibbs being away in Paris at the time.

"All the World's Airships."

WE are asked by Messrs. Sampson, Low, Marston and Co., to announce that from Monday next the price of "All the World's Airships," by Mr. Fred T. Jane, will be raised from 21s. to 42s. net.

FOREIGN AVIATION NEWS.

Bordeaux Meeting.

ALTHOUGH at one time it was announced that the great meeting of the Aero Club of France at Bordeaux, from September 11th to 18th, would be abandoned, there appears no doubt now that it will take place, and the Committee who are making the arrangements are sparing no pains to make it a success. The prizes total to 245,000 francs, and besides this the President of the Republic is offering a trophy. It is also expected that President Fallières will attend the aerodrome on several days during the meeting.

Doings at Mourmelon.

The Farman School.—On the 4th inst. Mr. Henry Farman, with the assistance of Weymann, was busy trying his new monoplane, and some good short flights were made. Several army pupils are taking lessons from their military *confères*, and Louis Dufour and Efimoff have also been busy teaching pupils. On Monday Captain Matzievicht flew half an hour, Captain Oulionne was up for 40 mins., Enos covered 15 kiloms. at his first attempt, and Michel Mahieu made a trip lasting 1 hour 2 mins. The best performances, however, were by Wynmalen, who first flew for 1 hour 5 mins., during which he circled round the Cathedral at Rheims, and subsequently went up to a height which his barograph recorded as 1,100 metres.

The Antoinette School.—During Sunday afternoon Commander Clolus, assisted by Laffont, carried out a series of experiments, photographing various parts of Chalons Camp from a height of 150 metres. Laffont was in the air almost continuously for four hours giving lessons to his various pupils.

Other Schools.—Weiss, on the Koechlin machine, has been doing well lately. On Monday he was flying for an hour and a quarter over the country, while on the previous day he was out for three-quarters of an hour, and reached a height of 300 metres.

Ladougne at Juvisy.

THE progress made by Ladougne on the Goupy biplane has been very marked during the past week. He was flying for an hour with a passenger on Monday, while on the previous day, during a trip lasting three-quarters of an hour, he rose to an altitude of 200 metres. On the preceding days he had made flights lasting half an hour and rising to 150 metres. On Sunday at Juvisy, Lesire, on a Voisin, flew for 50 mins. and reached a height of 100 metres.

Savary School at Chartres.

A FINE performance was made on Sunday at Chartres, when Picard, who has rapidly learnt to pilot a Savary biplane, twice covered a circuit of about 25 kiloms., passing over Chartres, Barjouville, Morancez, Corancez, Bercheres, Sours, and Bretigny. Altogether he covered about 53 kiloms. in 40 mins. Savary himself made one or two passenger flights, while Poillot at his first attempt flew 3 kiloms. in a closed circuit and later 5 kiloms.

A New French Monoplane.

REPORTS are to hand of very successful trials of a new monoplane which has been constructed at Casteljaloux by Bertin, the one-time racing motor cyclist. Piloted by the inventor's eighteen-year old son, on Wednesday of last week it circled several times round the Courlis aerodrome, and then rising above some tall pine trees it flew for 20 minutes over the surrounding country, the altitude varying between 30 and 50 metres. The speed was said to be in the neighbourhood of about 80 kiloms. an hour. On the previous evening three short passenger flights were made.

A Blériot "Bus" being Built.

M. BLÉRIOT is determined to keep well ahead, and the latest announcement is that he has nearly completed a four-seated monoplane. The *début* of this machine will be awaited with interest, and it would seem that the day of the aerial 'bus will soon be with us.

Ae.C.F. Doings.

At their last Committee meeting, the Aero Club of France nominated M. Alfred Leblanc as their representative in the United States in connection with the competitions for the two Gordon-Bennett Cups. It was also decided to grant pilot-aeronaut certificates for dirigible balloons to MM. Frederic Airault and Bainy d'Avricourt.

Fabre Hydro-aeroplane Out.

THREE trials were made with the Fabre hydro-aeroplane, illustrated in these pages a few weeks ago, on Tuesday week. Two of them were successful, but the third was brought to a premature conclusion through one of the floats breaking. This brought the propeller in contact with the water and the shock caused the aviator to be thrown from his seat to the water, and several parts of the machine gave way. However, the damage was not very extensive and will be quickly repaired.

Latham Flies to Dreux.

ALTHOUGH Latham was at Issy on Sunday morning, he felt too tired after his long flight of the previous day to start in the Circuit de l'Est competition. Later in the day, however, he set off to fly to Dreux, where his mother is residing, and landed safely in front of her chateau after an hour's trip, and in time for dinner.



The German Minister of War's prize, which he presented for competition at the Johannisthal Flight Meeting. This fine work is by Paul Aichele Friedenau, and measures about 3½ ft. in height. It represents symbolically the conquest of the air. The victorious youth holds up triumphantly in his distended arms an enormous eagle, the "King of the Air," which Man's arrow has conquered.

Nine who have Flown over a Kilometre High.

IT is interesting to note that at the present moment there are nine aviators who have flown at altitudes above one thousand metres (3,280 ft.). The names and the best records of each one are as follows:—

Brookins (Wright), Atlantic City	1,902 metres.
Chavez (Blériot), Blackpool	1,793 "
van Tych (Blériot), Brussels	1,720 "
Olieslaegers (Blériot), Brussels	1,524 "
Latham (Antoinette), Rheims	1,384 "
Morane (Blériot), Bournemouth	1,305 "
Drexel (Blériot), Lanark	1,300 "
Paulhan (H. Farman), Los Angeles	1,269 "
Wynmalen (H. Farman), Mourmelon	1,100 "

Amerigo at Mülhausen.

MOUNTED on an Aviatik biplane fitted with a Gnome motor, Amerigo, at Mülhausen, on Monday week, made a flight lasting 45 mins., and at a height of 300 metres. He afterwards carried MM. Lecoq and Danglard as passengers for ten minutes. On the 4th he carried out a 40-min. trip, while on Sunday last he was up for an hour at a height of 250 metres, and he was again in the air on Monday for 40 mins. He has also made several trips with passengers.

Japan Officially Takes Up Aviation.

It is reported from Berlin that the Japanese Government has ordered twenty-seven Wright aeroplanes from the German builders. They are to be delivered as soon as possible, and meantime Capt. Engelhardt is to instruct a similar number of Japanese officers in the manipulation of the machine. Seven officers commenced their lessons last Friday.

Aerial Regulations in Germany.

IN connection with the announcement recorded in our last issue, of a series of regulations regarding aeroplane flying in Brandenburg, it is interesting to notice that a commission is now engaged at the German Home Office in working out a scheme for the regulation of aerial traffic in Prussia. It is expected that the scheme will be ready before the International Conference meets again in Paris in November. Although it will only apply to Prussia, it is hoped that the other States will adopt it.



CROSS-COUNTRY FLIGHTS IN THE U.K.

Mr. Ferguson at Newcastle, Co. Down.

A FINE flight was made by Mr. H. G. Ferguson on Monday evening, when, mounted on his monoplane, he flew a distance of 3 miles along the foreshore at Newcastle, Co. Down, his altitude varying between 50 and 100 ft. The flying was watched by a large crowd, who cheered the aviator upon the completion of his trip.

Mr. Paterson Flies Across Country.

FOR some time Mr. C. C. Paterson has been practising at Freshfield with the biplane described in these columns on May 28th. Some very good work has been done recently by him, and on Bank Holiday Mr. Paterson successfully accomplished a trip to Southport, and also returned later in the day. On Wednesday Mr. Paterson repeated this feat, and caused a great stir by flying over the town of Southport, which is about 6 miles from Freshfield.

An Aeroplane at Rhyl.

VISITORS to Rhyl had an unexpected entertainment on Wednesday, when Mr. Hewitt brought his aeroplane over from Bodfry, and, starting from the front, succeeded in making a very fine flight. He followed the coast line for some distance in a westerly direction, and passed over the tops of the houses along the promenade.



AIRSHIP NEWS.

Slight Mishap to "Beta."

WHILE carrying out an instructional flight on Monday evening a slight accident befell the "Beta." Carrying Lieuts. Waterlow and Cammell, she first performed some manoeuvres over Farnborough, and started off on a wide circular tour to the west. While passing over Ewshot, the driving chain snapped, putting the propellers out of action. At once preparations were made for landing, and while coming down near Crookham the airship caught in a tall tree, from which it was eventually freed, and a safe landing made. Repairs were then speedily effected, and after the gas supply had been replenished, the airship rose again and returned to its shed at Farnborough.

Prince Henry on Polar Expedition.

As a result of the preliminary expedition now at work in Polar regions, Prince Henry of Prussia is stated to have said that he has no faith in airship expeditions to the Pole under present conditions. Until a more trustworthy motor is available such work is beyond the powers of airships as at present designed. In the meantime, however, data is being collected with regard to such questions as anchorage on the ice.

A Farman Biplane in the Italian Army.

AMONG the many splendid flights made lately by Lieut. Savoia on the Henry Farman biplane which he recently took to Italy was one at Centocelle on Tuesday week, when he was accompanied by Gen. Spingardi, the Italian Minister of War.

A New Italian Pilot.

USING a new racing Henry Farman machine, Sig. Leonino de Zara, at the aerodrome at Padua, succeeded in qualifying for his pilot's certificate. He flew for 60 kiloms., and subsequently took up four passengers for short trips, while he set up a new Italian record by taking two passengers simultaneously for one excursion.

Italian Flying School Opened.

ON Monday the official opening ceremony of the new flying school at Pordenone, near Milan, took place, when about 30,000 persons assembled to witness a series of exhibition flights by Cheuret on a Henry Farman biplane and Ehrmann on a Blériot monoplane. In the evening a banquet, at which the Government was represented, was given by the municipal authorities.

Flying Week in Winnipeg.

As will be seen from an announcement elsewhere, arrangements have been made for a flying meeting at Winnipeg during the last week in September. As this is just previous to the International meeting in New York it is hoped that some of the flyers engaged there will visit the Canadian city first. Meanwhile a pilot is required by the organisers for a Blériot machine.

From Blackpool to N. Wales and to Barrow.

TWO remarkable flights were made from Blackpool on Wednesday morning. The first was by Mr. Robert Loraine, who has been contemplating a trip to Ireland, via Holyhead and the Isle of Man. He arrived at the Blackpool aerodrome at six o'clock on Tuesday morning, and found the weather conditions almost ideal for flying. He therefore determined to try a cross-country flight. The Gnome was soon started, and at 6.26 a.m. Mr. Loraine was in the air, and, climbing to a good altitude, he eventually darted off in the direction of Southport, and, crossing the town, turned out to sea, direct across to the Welsh coast, striking it at Rhos, and landing on the golf links there after a flight of about 60 miles. The time taken was a little over an hour and a half. Mr. Loraine intended to fly on to Holyhead later in the day.

About 11 o'clock on the same day Mr. Grahame-White started up his Farman machine and paid a visit to the Fleetwood Barracks, 10 miles away. From there he re-ascended and flew to Barrow, across Morecambe Bay. He landed just by the shed for the big Naval dirigible, and after a ten-minute rest started off on the return journey to Blackpool, where he landed safely on the aerodrome at a quarter to one. He was flying at a good height, varying between 1,000 and 1,500 ft.

Italian Military Airships.

FROM Rome comes the news that the second military dirigible has been completed and sent to Verona, where it will be stationed. "Militaire III" is also very nearly finished, and she will proceed to her headquarters at Venice very shortly, while the construction of a fourth airship, to be reserved for naval purposes, has just been commenced.

"Clement-Bayard II" has Another Trial.

ON Sunday afternoon, "Clement-Bayard II" was out for an hour, and although there was a strong wind blowing it sailed from Lamotte-Breuil to Compiègne in 17 minutes. After cruising above the town for some time, it returned to its headquarters in 13 minutes, and eventually landed by the shed after a most successful trial.

Lady Balloon Pilots in France.

AN interesting item of the business transacted at the last meeting of the Ae.C.F. Committee was the granting of certificates as *pilote-aéronaute* for spherical balloons to Mdlle. Marie Tissot and Mme. Airault. Including these, the Ae.C.F. have granted five such certificates to ladies, the other holders being Mme. Surcouf, Mme. Emile Carton, and Mdlle. Marvingt.

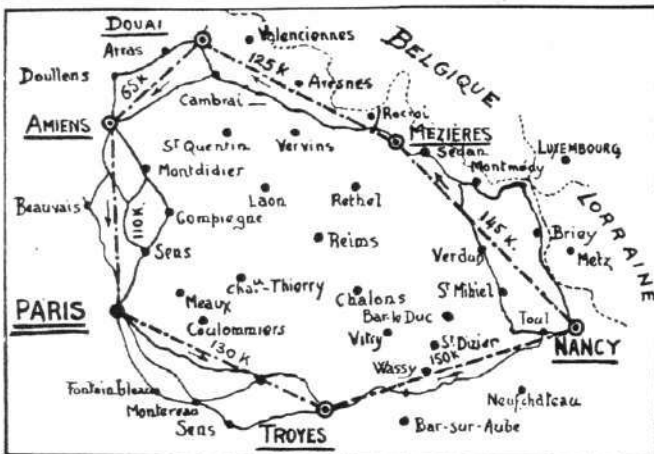
THE CIRCUIT DE L'EST.

OF the three dozen entrants for the Circuit de l'Est, the great ten days' French aerial competition organised by *Le Matin*, only ten were present at the start on Sunday morning, of whom eight were duly despatched on the first stage to Troyes. At first sight the small number of competitors may seem disappointing, but in view of the ambitious nature of the project and considering how short a time aviation has come into being, it must rather be written down as hugely satisfactory to find even half-a-dozen aviators ready to participate in such an undertaking.

By way of a preliminary canter Latham flew over on his Antoinette on Saturday last from Mourmelon to Issy, and his example was followed by Weymann on his Henry Farman machine. Both left in the early morning, but met with bad weather on the way, thereby not reaching Issy, a distance of 105 miles, until late in the afternoon. Latham made a stop at Noisel, in the Marne Valley, while Weymann, *en route*, landed at Vauchamps near Montmirail, at La Ferte-sous-Jouarre, and also at Meaux, where he sheltered in one of the Astra sheds from a downpour of rain. De Baeder had also intended to fly to the starting-point on his Breguet, and left Douai all right, but something going wrong with his motor he was forced to land near Bapaume. After getting matters put right he tried to get going again, but the great crowd which hemmed him in would not give him sufficient room to get away, and in trying to avoid them he smashed his machine. Two Army officers also made a preliminary flight on Saturday, Lieut. Crosnier, accompanied by Lieut. Jost, making a satisfactory trip from Caen to Vincennes on a Henry Farman biplane, with one stop just by Evreux, where they had to remain ten hours owing to the stormy weather.

On Sunday morning the weather was splendid, and as early as 3 o'clock the crowds began to assemble at Issy. Away in the distance the lower platform of the Eiffel Tower was soon filled in anticipation of the coming spectacle promised by the race. The start was fixed for 5 o'clock, and at 5h. 13m. 3s. Aubrun, on a Blériot, was given the word to rise. He was followed by Leblanc

on a similar machine in 5 mins. 40 secs., while Mamet, also on a Blériot, set off 4 minutes later. At half-past five Lindpaintner, on a Sommer, started up, and was soon out of sight, and Bielovucic,



Sketch map from *L'Auto* of the route for the Circuit de l'Est.—Starting from Issy, near Paris, the competitors will travel round by the six stages as indicated, commencing with Troyes, 130 kiloms.; Nancy, 150 kiloms., &c.

who had been delayed a few minutes owing to engine trouble, got his Voisin into the air within a minute, but after a preliminary turn was down again. Busson, on a Blériot, and Bregi, on a Voisin, also had trouble immediately they took to the air, but they eventually got away, as also did Legagneux and Weymann, both on Henry Farman biplanes. An unexpected incident during the time the



THE "CIRCUIT DE L'EST."—Starting for the first stage on Sunday last from Issy for Troyes, 135 kiloms. M. Latham has just arrived at Issy ground on his Antoinette machine, having flown over from Chalons, a distance of 169 kiloms., passing over Paris *en route*.

competitors were starting, was the arrival of Moissant with a passenger, on a Blériot; he had flown over to Issy from Etampes.

The first to arrive at Troyes was Leblanc, who reported that the only incident during his trip was when he lost himself after he had been travelling 20 minutes. He, however, quickly recognised the church tower at Mormont, and then set a straight course for his destination. Aubrun was taking no risks on the score of losing his way, and determined to follow the course of the Seine. This, of course, added a good deal to the journey, and so although he started first he finished two minutes after Leblanc. Lindpaintner was the next arrival, and then at long intervals came Mamet, Legagneux, and Weymann, the three last having been delayed on their journey through missing their way. Bussion, through motor trouble, landed twice. The second time, at Naugis, he smashed his machine so badly that he had to retire. Bregi also was in trouble with his motor, and came down at Pontecarré. He hoped to reach Troyes before the time limit expired, but in this he was disappointed. The times of the first three, for the 140 kiloms. from Issy to Troyes, were Leblanc 1h. 32m. 20s., Aubrun 1h. 37m. 25s., Lindpaintner 2h. 25s., and Mamet 3h. 8m. Leblanc won the first prize of 7,000 frs., Aubrun took the second prize of 3,000 frs., and Lindpaintner third prize of 1,000 frs.

Monday was spent at Troyes, and in the afternoon Weymann, Legagneux, and Lindpaintner competed for some prizes offered locally. Weymann secured the cross-country prize by flying 12 kiloms. in 11 mins. 56 secs., and he also took the passenger

prize with a trip of 16 mins. 42 secs. In the height contest Lindpaintner was first with 420 metres, Legagneux taking second place with 380 metres, while his time for the 12 kiloms. across country—13 mins. 3 secs.—also secured him the second prize in that event.

At five o'clock on Tuesday morning four of the competitors lined up for the start on the second stage to Nancy, and Lindpaintner was the first away at 5.14. At that time there was a heavy fog, and the Sommer pilot had difficulty in finding his way, eventually landing at Valleret. Legagneux was the next to get off, and finally, at twenty minutes to six, Aubrun rose into the air, quickly followed by Leblanc. Weymann and Mamet were unable to start, owing to repairs being necessary to their machines. On the first day the flags which were put up to indicate the route were found to be ineffective, and on the second stage large white sheets were spread on the ground in some places, and bonfires lighted in others, which resulted in considerable improvement. The different competitors all complained that the journey had been very exhausting, owing to varying air currents. Both the Blériot pilots were fortunately able to keep a straight course, and they were the first to reach Nancy. Leblanc, as on the previous day, overtook Aubrun, and finished the 150 kilom. journey in 2h. 19m. 49s., while his companion took 2h. 27m. 50s. Legagneux got lost, but he eventually arrived safely after 5 hrs. 31 mins., and Lindpaintner, who landed at Valleret, hoped to complete his journey before the time limit expired. In landing he had broken a skid, but it was anticipated that this would be repaired within a few hours.



CONTINENTAL FLIGHT MEETINGS.

Brussels Meeting and a Fatal Accident.

THE closing days of the Brussels Meeting were marred by a fatal accident, and by a coincidence Kinet-Nicolas—was the victim. He was flying at a height of 200 metres on Wednesday week, when, apparently owing to a stay giving way, the machine lost its stability and dashed to the ground. The unfortunate aviator was struck by the motor and killed instantly. Although their names were similar there was no relationship between Nicolas and Daniel Kinet, who met his death under similar conditions only a week or two ago at Brussels. Nicolas Kinet was at one time a well-known motor cyclist, when his most strenuous opponent was Olieslaegers, whose lot it was to be the first to reach the scene of the accident.

He had been very successful as a flyer of the Henry Farman type of machine, and his world's record for a passenger flight, 2 hrs. 51 mins., made on May 15th last, still stands. At several meetings he had made good performances, finishing second to Wagner at Budapest, while at Rheims he secured eighth place.

During the last days of the meeting Olieslaegers carried off practically all the prizes. On Tuesday of last week he secured the daily duration prize with 51 mins. 14½ secs., the height prize with 630 metres, and the speed prize, leaving the landing prize to be won by Van den Born. During the day the King of Belgium visited the aerodrome, and the various aviators were presented to him. On Wednesday Kinet was in keen competition with his old rival Olieslaegers, and had been flying for over two hours and a half, when a sudden storm swept over the ground and the fatal accident occurred. Thursday, the last day, saw very little flying, Olieslaegers having matters all his own way. His longest flight was of 31 mins. 18 secs., while his best height was 450 metres, and his time over 4½ kiloms. in the speed test 6 mins. 49 secs.

Prize-Winners at Caen.

ALTHOUGH Hanriot did not fly on Tuesday week, the last day of the Caen meeting, his activity on the previous days had made his position as leader in the cumulative distance secure. The longest flight during the day was by Martinet, who was out for 1h. 2m. 3½s., but this performance was not so spectacular as that of Morane, who indulged in a little high flying, reaching an altitude of 1,250 metres, while his *compère*, Aubrun, went up to 475 metres. The second longest flight was by Aubrun, 37 mins. 33½ secs., while Paillette was third with 28 mins. 39½ secs. The prize-money was distributed as follows:—Morane (Blériot),

16,000 frs.; Hanriot (Hanriot), 13,000 frs.; Martinet (H. Farman), 6,500 frs.; Aubrun (Blériot), 5,000 frs.; Paillette (Sommer), 3,500 frs.; Renaux (M. Farman), 2,000 frs.; Chauveau (Antoinette), 1,500 frs.; Crochon (Sommer), 1,000 frs.

Flying Week at Johannisthal.

A FLYING meeting was to have commenced at Johannisthal, near Berlin, on Sunday, but the bad weather precluded any flying, and the opening was therefore postponed until Monday. Then the flying was shared by Wiencziers on an Antoinette, Capt. Engelhardt on a Wright, and Thelen also on a Wright. The first-named had the best aggregate, having flown for 36 mins. in two trials. Engelhardt in four trips totalled 11 mins., while Thelen's record was 9 mins. in two attempts. On Tuesday Wiencziers flew with a passenger for 41 mins., and Dörner (Dörner) for 29 mins., while the solo flights were Thelen (Wright), 40 mins., Heim (Wright), 27 mins., Taitoch (Voisin), 27 mins., Brunhuter (Sommer), 18 mins., Jeannin (Farman), 10 mins., Behrend (Behrend), 8 mins.



"Flight" Copyright.

THE SIGN OF THE "BLUE BIRD."—One of the latest and a very welcome addition to the aviation grounds at Brooklands.

PROPELLER THRUST.

AN INVESTIGATION INTO THE THRUST OF A SINGLE PROPELLER-BLADE BY MEANS OF A MATHEMATICAL DEVELOPMENT OF THE ANALOGY BETWEEN THE BLADE OF A PROPELLER AND AN AEROPLANE.

By C. J. STOKES.

It is very commonly supposed that the fundamental Newtonian formula for thrust

(i) $T = mf$ (where T = thrust, m = mass, f = acceleration), may, for the static thrust of a propeller, be expressed in the form

(ii) $T = \rho A p^2 n^2$ (where T = thrust, ρ = density of air, A = geometric disc area of propeller, p = geometric pitch, n = revolutions); or, in the case of a propeller in flight, by a modified formula of the same order, such as

(iii) $T = \rho A s^2 n^2$ (where s = slip expressed as a definite length), which may be further rearranged in the very convenient form

(iv) $T = \kappa D^2 V^2$ (where T = thrust, D = propeller diameter, V = flight speed of aeroplane, κ = a constant including in one term all the separately derived constants in the preceding formulae).

Now the above expression, thus derived, is based solely on the geometric measurements of the propeller. It assumes that some constant function, such as is represented by the difference between the pitch-speed and flight-speed, is a correct expression of the slip-stream velocity. It further assumes that this velocity is simultaneously uniform over the disc area, and it ignores the blade area altogether. Wherefore, it appears to me to be an inexact way of regarding the subject, and my idea appears to be confirmed by statements in your very interesting editorial article on testing propellers.

Therein you justly emphasise the real convenience of using the single constant, κ —first suggested by "Naval Constructor" in his earlier article on Propeller Design—but very properly point out that its practical value essentially depends on its inclusion of experimentally-determined coefficients of area and pitch. That is to say, while the aeroplane designer knows by direct calculation from formula (iv) the one value of κ that satisfies his machine, the propeller constructor who presents the chart to which κ is an index, must essentially prepare those graphs, which show efficiency and revolutions, from actual experimental data obtained by tests on his own screw under conditions of flight and not from mere mathematical calculations based on the geometric pitch and some assumed slip.

That there is common sense in determining the value of κ , in respect to screw propellers, by means of actual experiment rather than by calculation, will be recognised by everyone, but that the application of the basic formula (ii) is open to criticism does not seem to be so generally understood. The main cause of its inaccuracy appears to me to lie in the fact that the slip stream velocity is not even theoretically represented by that function of $p n$, which is ascertained by subtracting the actual advance from the geometric pitch, and the reason for this becomes clear when the action of a propeller is analysed by regarding the propeller as an aeroplane; an analogy that is strongly advocated by Lanchester in his "Aerodynamics."

The following investigation of the subject is, I believe, original, and may interest readers of FLIGHT. It does not pretend to be complete, but it has been developed to a stage that may serve as a basis for useful discussion:—

Take a cylinder (Fig. 2) and wrap round it a piece of paper so that the edge at the finish is parallel to the axis of the cylinder. Along this edge put the letters PSO and immediately behind O put the letter R. From R draw a line round the cylinder to O, and two others from R to S and R to P; then, laying the paper out flat, we have the diagram PSOR in Fig. 1.

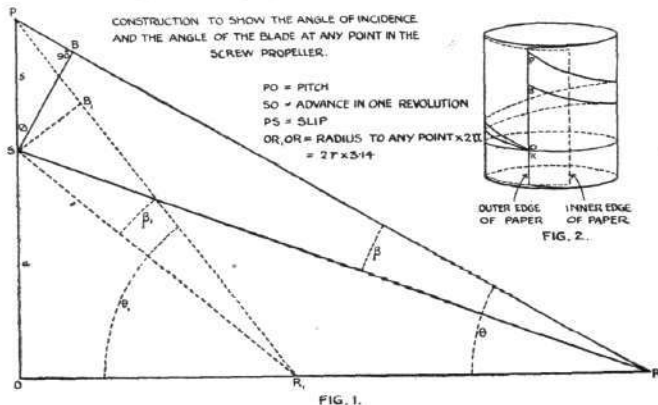
In this diagram, which represents the functions of a screw, the geometric pitch, p , is shown by the line PO, and the actual advance, a , made by the propeller in one revolution, is shown by the line SO. The difference between these lengths is the line PS, and represents the slip, s .

The base, OR, being the developed circumference of the circle described by the tips of the blade, the angle, θ , is, therefore, the blade angle at the tip. Of this angle the amount, β , represents the effective angle of incidence, for $(\theta - \beta)$ is the true advance, and that part of the angle, if it may be considered as a separate element—as you suggest in your article on testing propellers—slides through the air without accelerating it.

For any other radius of which (OR) is the circumference, the angles θ, β , correspond to θ, β , and it is important to observe that not only does the actual geometric angle, θ , of the blade vary at

different points along the radius with a constant pitch blade (as is well known and is also obvious by inspection), but the effective angle of incidence, β , likewise varies.

This last fact does not appear to be generally recognised, and it is the first important deduction resulting from a consideration of the analogy between a propeller blade and an aeroplane. Coupled with



the more obvious fact that the actual velocity through the air of different elements of the blade at different distances from the axis of rotation is also a variable quantity, this deduction forms a most important factor in the *raison d'être* of the following mathematical analysis.

Before proceeding further, however, it may be as well to establish the following relations:—

The effective angle of incidence is a maximum when

$$(v) \quad \cos \theta = \sin(\theta - \beta),$$

that is, when the radius

$$(vi) \quad r_1 = \frac{\sqrt{pa}}{2\pi}.$$

The helical flight-path of a propeller blade for one revolution is represented in the diagram by the line SR, which has a numerical value obtained by the expression

$$(vii) \quad SR = \sqrt{(2\pi r)^2 + a^2};$$

whence

$$(viii) \quad V = n \sqrt{(2\pi r)^2 + a^2}$$

(where V = velocity of the blade element in its helical flight path, n = revolutions per second, r = radius of element from axis of revolution, a = the true advance of the aeroplane per revolution of the screw).

and:

$$(ix) \quad \sin \beta = \frac{BS}{SR} = \frac{s \cos \theta}{\sqrt{(2\pi r)^2 + a^2}}$$

By the aid of these expressions we can apply the fundamental formula:—

$$(x) \quad P\beta = kV^2 \sin \beta$$

(where $P\beta$ = pressure per unit area normal to surface of blade, V = helical flight speed, k = a constant) to an elementary surface defined in position by its radius.

The expression, $P\beta$ represents the pressure normal to the inclined surface of the blade, and must, therefore, be resolved into its components in order to equate the axial thrust in the expression:—

$$(xi) \quad T = kV^2 \sin \beta \cos \theta$$

$$(xii) \quad = kn^2 \left[\sqrt{(2\pi r)^2 + a^2} \right]^2 \frac{s \cos \theta}{\sqrt{(2\pi r)^2 + a^2}} \frac{(2\pi r)}{\sqrt{(2\pi r)^2 + p^2}}$$

$$(xiii) \quad = kn^2 s \sqrt{(2\pi r)^2 + a^2} \left[\frac{(2\pi r)^2}{(2\pi r)^2 + p^2} \right]$$

It will be observed that this last expression has only one variable (r), for the speed of revolution (n), the slip (s), and the advance (a), are by assumption constant.

The total thrust along a radius ($r-r_1$) of elementary chord may, therefore, be expressed thus:—

$$(xiv) \quad T = k_1 \int_{r_1}^r \frac{(2\pi r)^2 \sqrt{(2\pi r)^2 + a^2}}{(2\pi r)^2 + \beta^2} \cdot dr.$$

As the value of (r) becomes large the above expression approximates to the form:—

$$(xv) \quad T = k_1 \int_{r_1}^r 2\pi r \cdot dr$$

$$(xvi) \quad = k_1 \pi (r^2 - r_1^2)$$

(where $k_1 = kn^2s$). If the lesser radius be zero the thrust becomes a function of the disc area, which conforms in general to the corresponding expression in formula (ii). It will be noticed, however, that the numerical value given to the two radii arbitrarily defines the effective area, and is therefore equivalent to introducing the coefficient of area suggested in your article on testing propellers.

The next question to be decided is whether the slip-stream velocity in the annulus is uniform. It has been shown that the angle of incidence and also the helical flight speed vary with the radius. The latter is given by the expression in formula (viii).

Resolving the helical flight speed into its components gives the rearward slip speed in the expression

$$(xvii) \quad v = V \tan \beta,$$

but if we assume that β is small, we may write without appreciable inaccuracy

$$(xviii) \quad v = V \sin \beta$$

in which an expression for $\sin \beta$ is already available from formula (ix).

The above expression for v may therefore be written—

$$(xix) \quad v = n \sqrt{(2\pi r)^2 + a^2} \frac{s \cos \theta}{\sqrt{(2\pi r)^2 + a^2}}$$

$$(xx) \quad = ns \cos \theta.$$

Near the tip of the blade $\cos \theta$ may be nearly unity, but near the axis it must be a small fraction, so that it would seem as if the mean velocity under these conditions can never equal the slip.

The net result of this analysis has therefore at least resulted in showing that neither the area nor the velocity in the fundamental formula (iii) can be expressed by simple deduced values from the diameter of the propeller and the difference between the pitch and the advance.

This conclusion does not in any way detract from the value of formula (iv); it merely emphasises the necessity, which you have already pointed out, of establishing values of κ by practical experiment, at any rate until such time as the data thus collected shall enable us to estimate the value with greater accuracy than is possible at present.

EDITORIAL NOTE ON MR. STOKES' ARTICLE, AND AN INVESTIGATION INTO THE PERMISSIBLE NUMBER OF BLADES FOR ANY GIVEN PROPELLER.

THE foregoing very interesting analysis opens up a wide field for discussion, and suggests a most instructive point of view from which to regard the mathematics of the propeller. As the author remarks, the investigation has hardly been pushed to its furthest useful limits, and indeed there are some points that already occur to us as worthy of comment.

It will be observed that the expression in formula (xvi) equates the thrust created by an elementary radius to a function of the area of the annulus that its path defines. In general, therefore, the above analysis may be said to be a confirmation of the presence of the term representing disc area in the fundamental formula (ii). But the important point to be borne in mind is that the foregoing integration only sums the thrust along a radius of elementary chord, so that in making a further integration of the adjacent elementary radii that together complete the full chord of the blade, only those that maintain the acceleration can be recognised, for the elementary radius at the leading edge has established its claim to the entire available field of action, which is defined by the above expressed annulus. In other words, the chord of the blade is only effective so long as the pitch is progressive, i.e., the blade face is cambered. If we assume that the entire chord is effective, then the thrust created and maintained by one blade of area

$$(xxi) \quad l(r-r_1)$$

(where l = mean chord of blade) will be given by the expression

$$(xxii) \quad T = k_1 \pi (r^2 - r_1^2) l.$$

Thus far only one blade has been considered, but no propeller in actual use has less than two. The question is, therefore, what contribution are the other blades capable of making to the total thrust? It has been shown how the entire annulus (disc area) has been claimed by the elementary radius of the leading edge, and how an extension of the chord can be rendered effective only so long as it maintains the initial acceleration. If the chord of the blade is thus developed to the limiting angle at the trailing edge, it is obvious that no other blade can be added to carry on the work. The only justification for more blades must therefore be based on a claim that they can work on still air, and thus reproduce the actions of the first blade within its own field of operations.

It has been shown that the first blade during the course of each revolution accelerates the entire mass of air within the disc area, but it should be noted that this acceleration does not take place simultaneously throughout the mass, nor has it even been proved that the disturbance necessarily exists simultaneously throughout the mass. It is, in fact, readily conceivable that one or even more blades might be made to work in the same zone with a corresponding (if not strictly proportional) increment to the total thrust derived from the propeller as a whole. The limiting number of blades thus possible (or rather desirable from an efficiency point of view) will obviously be determined by their mutual interference. This factor seems at first sight to be one that it is difficult to assess on theoretical grounds. Experiment probably offers the only reliable method of arriving at a useful knowledge of the limiting number of blades. Lanchester has suggested the following empirical formula:—

$$(xxiii) \quad N = 2.5 \frac{(r+r_1)}{(r-r_1)}$$

(where N = permissible number of blades).

The experiments of R. E. Froude (see Naval Constructor's article) give the relative thrusts of two-, three- and four-bladed propellers as being in the proportion

(xxiv) 0.650 : 0.865 : 1.000, which shows that the thrust does increase as the number of blades, but not in direct proportion.

In the following deductions we suggest an alternative method of estimating the number of blades, which is based on the foregoing analyses taken in conjunction with Froude's ratios. The basis of our argument is that the limiting thrust from any propeller is defined by an application of the fundamental formula (iii), for that in itself goes back to Newton's laws. It is reasonably certain that the disc area represents the maximum cross section of the slip stream that any propeller can set in motion, and if we assume a slip stream velocity as uniform throughout the area, it is very certain that the acceleration of a mass thus represented must have called for the exercise of a force that is pretty accurately expressed by the formula in question. Such being the case, it is only logic to argue that a statement of the disc area, slip stream velocity, and density of the air necessarily defines the maximum thrust that can be derived from any propeller giving rise to those conditions. If, therefore, the total possible thrust from a given disc area be calculated by formula (iii), and the individual thrust of one blade be calculated by formula (xxii), the ratio of these values ought to represent the permissible number of blades for any given propeller.

In conclusion it may be of interest to make such a numerical comparison, and for the sake of example we will consider a propeller in which it is assumed that—

Diameter	... = 6 ft.	Advance	... = 4 ft.
Pitch ratio	... = 1.00	Slip = s	... = 2 ft.
Chord = l	... = 75 ft.	n	... = 20
r_1	... = 1 ft.	k	... = .003

Then thrust of one blade

$$T = k_1 \pi (r^2 - r_1^2) l$$

$$= kn^2 \pi (r^2 - r_1^2) l$$

$$= 0.003 \times 400 \times 2 \times \pi (9 - 1) 0.75$$

$$= 45 \text{ lbs.}$$

Assuming that this value may be doubled for two blades, and taking Froude's values, we get

2 blades, $T = 90$ lbs. 3 blades, $T = 120$ lbs. 4 blades, $T = 140$ lbs.

By the fundamental formula (iii), the theoretical thrust to be derived from the acceleration of a slip stream throughout the entire disc area is given by the expression

$$T = \frac{\rho}{g} A v^2 n^2$$

$$= \frac{28.2 \times 7 \times 400}{400}$$

$$= 113 \text{ lbs.}$$

Comparing these results, it will be observed that the theoretical value derived from formula (iii) lies between the estimated values for the two and three-bladed propellers, whence it might be deduced that the three-bladed model would be the most efficient to use under the circumstances.

In cases where the difference between the area of the annulus and the disc area is not very great, this relationship would hold good throughout any range of diameters, for in both cases the thrust

would be proportionate to D^2 . Any change in a factor that is not common to both expressions, however, will destroy the relationship, thus, for instance, if the chord of the blade can be effectively increased, then the thrust of one blade will be proportionately greater, and the thrust of a two-bladed propeller might in that case be equal to the theoretical value derived by the alternative method.

Whether this is or is not a reliable method of estimating the permissible number of blades we do not pretend to say, but it is at least worth considering. It may be remarked that the chord of the blade is practically the only factor that affects one expression without affecting the other. It has been commonly supposed that the chord of an aeroplane defines the sweep of the stratum of air deflected; and since it may be presumed that the sweep is one of the factors that determine the range of the disturbance created by each blade, it might be argued that the chord should certainly be considered in

estimating the permissible number of blades, as it undoubtedly is by the method adopted above.

It is important to bear in mind when dealing with Froude's ratios that the four-bladed propeller is taken as unity, and in utilising data of this description, it is by no means justifiable to assume that they are equally accurate when used in the reverse sense as has been done in estimating the thrusts for the three and four-bladed propellers above. In other words, the mere application of those ratios in that way is no sort of proof that it should be possible to obtain a thrust of 140 lbs. from a four-bladed propeller of which a single blade has a calculated thrust of 45 lbs. according to the formula previously established. If, however, we assume that Froude's ratios are accurate within limits that are otherwise ordained, we are provided with a very useful method of deciding on the permissible number of blades, provided that we can define the above-mentioned limit.

LONG-DISTANCE FLYING BY FRENCH OFFICERS.

EXTRAORDINARY success attended some experiments carried out by the French military authorities on Sunday afternoon. Five military officers were given instructions to go by air to Nancy from Chalons, and this task was satisfactorily carried out. Lieuts. Cammerman and Vuilleme were the first to leave, at a quarter past four, and with the former officer in the pilot's seat the Farman machine made a wide detour over Verdun and Toul, observations being taken *en route*, and eventually a landing safely made at Nancy at 8.45 p.m. Lieut. Fequant, with Capt. Marie as the observer, left Chalons at a quarter past five, and taking the route over Pagny and the Hove Forest landed at Nancy at 7.20. Soon after Lieut.

Fequant started he was followed by Lieut. Caumont on a Sommer biplane, and he reached Nancy at 7.47. He flew mostly at a height of 900 metres, and kept Lieut. Fequant in sight for some time.

On Monday Lieut. Caumont flew over to the camp at Luneville, and after delivering despatches there returned to Nancy. The same day Lieut. Crosnier started to fly from Vincennes to Chalons, accompanied by Lieut. Jost. He had risen to a height of 20 metres when, for some unexplained reason, the biplane pitched to the ground. Lieut. Jost escaped uninjured, but his companion sustained a broken leg, and was taken to the military hospital at Vincennes.

CORRESPONDENCE.

. The name and address of the writer (not necessarily for publication) MUST in all cases accompany letters intended for insertion, or containing queries.

Correspondents asking questions relating to articles which they have read in **FLIGHT**, would much facilitate our work of reference by giving the number of the letter.

NOTE.—Owing to the great mass of valuable and interesting correspondence which we receive, immediate publication is impossible, but each letter will appear practically in sequence and at the earliest possible moment.

MR. J. T. C. MOORE-BRABAZON AND AVIATION MEETINGS.

[676] There seems to be an impression that I have definitely given up aviation, owing to its dangers or what I do not know, so that if you will grant me a few lines of your paper for an explanation as to my apparent cessation of experiments, you would do me a favour.

First of all, *re* the danger of aeroplaning. This, to my mind, is diminishing every day—granted, owing to there being many more aviators, there are, consequently, more accidents; but nothing will persuade me that aviation is not getting safer every day, engines are more reliable, machines more stable, engineers more conversant than formerly with the construction of machines.

It seems, therefore, to me hardly fair, either to Mr. Cockburn or myself, to assume that we are giving up aviation because it is, or has become, dangerous. If it is dangerous now, it was more dangerous a year or more ago, before most of the present-day cracks had learnt to handle a machine.

What has happened is that Mr. Cockburn, as also myself, have realised the small chance and impossible position the real amateur has at public meetings. He has to compete, not against men of similar means with machines of their own, but against firms with a great deal of capital at their back, and with the idea of advertisement before them accruing from winning certain prizes, a situation entirely similar to what occurred in early motor-racing days.

An engine misfires! No one thinks of putting it right. Another engine is slipped on to the machine. A wheel buckles. Another machine is brought out, while half-a-dozen mechanics from the "maison" repair the disarranged parts.

Were I a millionaire, I possibly could compete against such organisation, but unfortunately I am not, and therefore I believe it best to let it alone as far as appearing in public is concerned. In the very early days, private men with time and money were wanted, and I think, perhaps, did a lot to help the movement on, but now the private man is the unfortunate individual the cracks wish to sell machines to.

Do not let it be supposed I think ill of the professional with a firm at his back. On the contrary, I think he is doing a lot of good, more than the private man now could; but do not let us confuse the two individuals, the private individual and the firm's professional.

The day of the private investigator is over, and I for one very much regret it, but it is for the good of the movement that it is so, and consequently we must welcome it.

Flying in public, or at meetings, I certainly have given up, under present conditions, but that in no way is the same as abandoning flying altogether. To abandon aviation at the present time would be similar to abandoning motoring after the Paris-Bordeaux race, when the automobile movement was in its infancy.

When I took up aviation nearly four years ago, I looked upon it as a scientific investigation with a vast future before it. In that future I still believe, but whether the best interests of aviation are being studied by turning a highly complex mechanical problem into a travelling form of entertainment, I very much question.

That Mr. Rolls' death was *directly* due to this form of gymkhana I emphatically believe, and, on this account alone, you will forgive me if the tone of this letter is somewhat bitter against aviation meetings of any kind.

J. T. C. MOORE-BRABAZON.

THE ANGLE OF DEFLECTION.

[677] I have carefully read your article "Can we fly faster for less power?" in issue of July 9th, and think I see many possible pitfalls therein for the average reader. For instance, what would be the "curve" if there be no angle of deflection? From an excessive and really dangerous camber—particularly in some of the monoplanes—I am of the opinion your article will tend towards accelerating the other extreme, too little camber.

I do not remember having read in your journal a clear description of why the camber is necessary.

Penge.

A. EDMUND PARNACOTT.

[A plane having no angle of deflection would, of course, be flat, that is to say, it would have no curvature at all. On the other hand we consider that a flat plane flying with a positive angle of incidence has a virtual angle of deflection in excess of the angle of incidence, owing to the upward trend of the wind caused by the cyclic current. We believe that the neglect of this upward trend is the reason why ordinary calculations for the inclined flat plane inadequately account for the lift that they are known to produce.]

An inclined flat plane flying in a horizontal path gives rise to a cyclic disturbance round the leading edge which causes the relative wind in which it is flying to have an upward trend in the immediate vicinity of the leading edge, and in order to receive this relative wind tangentially without shock the leading edge itself must be dipped downwards so as to lie tangential to the relative stream. A plane thus constructed would have a sharp angle where the leading portion joins the trailing portion, and in order to avoid such an obvious source of inefficiency the plane is made with a gradual curved surface from one edge to the other, thus retaining the dipping

front edge and its tangential entry and affording by means of the camber a uniform rate of downward acceleration to the air. Our correspondent suggests that we have not explained the dipping front edge before, but from our first reference to it on page 296 of the first volume of **FLIGHT** until the present time, we have repeatedly referred to the matter in all its aspects, and many of our footnotes to letters of other correspondents have dealt with this most important point in aeroplane design.—ED.]

GLIDER DESIGN.

[678] I am anxious to construct a glider, and should like to know what you would suggest as a suitable area to support a total load of 300 lbs., and also whether it is necessary to have any special fabric for the wings.

Cardiff.

R. G. C. ROBINS.

[We would suggest basing the design of the glider on $\frac{1}{2}$ to $\frac{3}{4}$ lb. per sq. foot, and it is unnecessary, in the first instance, to use special aero fabric, although it is doubtless preferable in the long run. A good strong calico will serve.—ED.]

STEERING CONTROL.

[679] While greatly interested in the diagram of the above device described by M. F. Wheeler in letter No. 600, permit me to point out that this "combined" means of control is by no means new. I remember while enjoying the privilege of serving under Mr. A. V. Roe of triplane fame nearly two years ago, he developed a similar but more complete method of universal control for one of his first machines. I considered this somewhat of a masterpiece for combined utility and ease of handling, and until I saw your correspondent's description of his design I have seen nothing like it.

Newport Pagnell.

HENRY BATH.

STABILITY DEVICE.

[680] The suggestion of Mr. J. H. Dorans (No. 602) has its dangers. It would be absolutely necessary to cut out the apparatus when turning a corner, or the centrifugal action on the mercury would capsize the machine by causing a rise on the outer edge of the curve. As a turn is often wanted on short notice to avoid obstacles or to compensate for gusts, the cutting out must be automatic. More complications to get out of order. Its action would have to be gentle or slow, otherwise its jerky action would be fatal, especially when the machine is in difficulties, just when assistance is most wanted. This would imply additional mechanism, as the ordinary control must answer quickly. Mercury contacts are for ever oxidizing and becoming no contacts.

Hastings.

H. F. CHESHIRE.

"FLIGHT?"

[681] Is not the word "flight," as applied to aerial machines, a misnomer? Is not the propelling power and the shape more in harmony with the characteristics of the flying gurnard of the Indian seas, or the dolphin and the whale moving in the denser element, water? The action of the propeller at the head of the monoplane is not widely dissimilar to the action of the pectoral fins of the fish; the revolution of the propellers at the stern of the biplane performs the propulsive duties of the caudal fin, used chiefly by the largest dwellers of the ocean. Other fins, such as the ventral, anal, dorsal and pectoral, serve the same steadying purpose to the fish in the water as do planes in the aeroplane in the air. They both likewise serve similar duties for elevation or depression in their respective elements. Swimming in the air would be a more exact definition of the movement of aerial craft. Nor do the huge blundering airships possess any of the characteristics of the bird; in outline they resemble a fish, and when in motion a marine monster propelled by the caudal fin. Architects of these vessels will undoubtedly eventually copy the section of the fish when fashioning their craft, instead of persisting in the sausage-shape pattern up to the present time adopted. Speed, consequent on less resistance to the air, will be gained; also a greater facility in steering will be obtained, owing to the resisting lateral sides affording an improved fulcrum.

Sydenham.

G. H. LANE.

PARACHUTES AND AEROPLANES.

[682] As a constant reader of **FLIGHT** would you kindly inform me whether it would be possible for an aviator, 1,000 ft. in mid-air, to leave his seat for terra-firma by means of a parachute.

Birmingham.

JAMES SMITH.

[It would be quite out of the question at present for a passenger to attempt a parachute descent from an aeroplane, for, in the first place, the parachutist would have very little chance of quitting the machine in safety, owing to its high speed, and secondly the pilot could not possibly be expected to keep a modern machine under control whilst such an operation was in progress.—ED.]

MODELS.

HELICOPTER AEROPLANE.

[683] It is my intention to experiment with a propeller attached to the top of the machine with a view of lifting the machine off the ground without taking the usual run along the ground until sufficient speed is developed to allow the machine to rise.

If you have heard of any experiments in this direction, and the results which have attended them, I should be much obliged if you could let me know through the medium of **FLIGHT**.

I must congratulate you on your splendid paper, which, in my opinion, no model maker can afford to be without.

Barnes.

L. G. WRAY.

[A machine that cannot run along the ground, even after it has been given an initial start, is not likely to be able to fly if it is lifted up into the air by means of a helicopter, because in flight the propulsive force has to overcome aerodynamic resistance due to the support of the machine while on the ground, the dead load is taken by the earth so long as the speed is inadequate for flight. In any case the helicopter would be an encumbrance, and would involve considerable extra weight.—ED.]

MODEL ENGINE POWER.

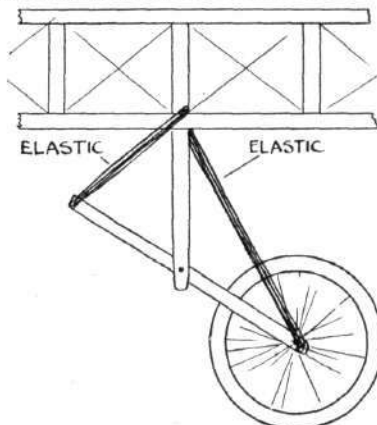
[684] I shall be pleased to have suggestions from your readers as to a suitable motor for driving a model monoplane. The span is 40 ins.; chord, 11 ins.; overall length, 40 ins., and the weight without the propeller is 9 ozs.

Hendon, N.W.

A. CURTIS.

CHASSIS FOR MODELS.

[685] I enclose a sketch of a light and very simple chassis that I have used successfully on models, in the hope that it may interest



other readers of **FLIGHT**. The wheel is carried on a cantilever, and is sprung by means of elastic, similar to that used for the "motor" in the manner indicated in the sketch.

Glasgow.

A FLIGHT SUPPORTER.

MODEL CLUB FOR BLACKPOOL.

[686] Seeing your correspondent's letter (654) re proposed model aero club for Blackpool, I heartily second the notion. I, like your correspondent, know many who would become members. I take the opportunity of writing this to see if it will be possible for some gentleman to fix up a meeting.

41, Brunswick Street, Blackpool.

JOSEPH H. BOLTON.

MANCHESTER MODEL CLUB.

[687] In your issue of August 6th, No. 672, is a letter headed "Manchester Model Club," which, if allowed to go uncorrected, may cause a misapprehension. There is in connection with the Manchester Aero Club a model section, already in full swing, with its own flying ground, workshop, and information bureau.

We have members of the model section from all the surrounding districts, such as Swinton, Worsley, Altrincham, &c. Some excellent prizes are offered for flying competitions, and a full series of interesting lectures has been arranged for the winter.

The subscription is 5s. per annum for juniors, and 7s. 6d. for adults. I shall be glad to forward a syllabus to anyone interested on receipt of a postcard.

Manchester Aero Club,
32, Mansfield Chambers, St. Ann's Sq.

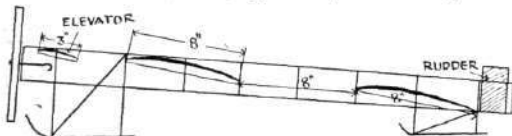
JOHN W. CARR, Hon. Sec.,
Model Section.

TANDEM MONOPLANE QUERIES.

[688] Could you please help me in a little matter in which I am puzzled?

I have made a tandem monoplane (drawing enclosed) and it goes well as a glider, balance perfect, but when I fitted a propeller it would fly for six or seven yards, then stop and come down tail first; if I weighted it in front it would fly straight, but as soon as the propeller stopped it would drop on its head.

I had both planes at the same angle, at top of frame, but I lowered the rear one (see drawing), thinking that would improve the



flying, but it went just the same, although as a glider it went better than ever; the planes are single surfaced, the ribs being on the upper side. Is this correct?

I have fitted a 2-foot motor with eight yards of $\frac{1}{4}$ in. elastic and 10 in. propeller, and when put on the ground it will run about two yards, then rise, but the tail soon drops, and it goes round in a circle with the tail on the ground.

I should be very grateful if you could tell me what is wrong with it. Nottingham. W. L. KELHAM.

[When the model is flying under the power of the propeller the forward plane has its virtual velocity of flight increased by the slip stream from the propeller. At first this artificial draught is probably considerable, but it would only last a short time, for the elastic motor gives a diminishing thrust, and in a short while the slip stream would become less important. Our correspondent seems to suggest that this happens rather suddenly. The machine would fall because it is not really flying through the air at its proper velocity for support. Moreover, the slip stream from the propeller would alter the attitude of the model in flight by lifting the forward plane a little too much so that it is unable to obtain its proper gliding attitude when the motive power fails.]

It is a little difficult to know what to do to cure the evil; possibly the fitting of a pair of propellers, if it could be conveniently done, between the first and the second planes, instead of a tractor-screw in front, might help matters. This would, of course, mean redesigning the model practically from start to finish.—ED.]

MESSRS. COCHRANE AND COCKBURN, of 26, Clarges Street, Piccadilly, inform us that they have secured a 1910 genuine Blériot machine to give exhibition flights at fetes and garden parties at a very reasonable figure. Dates can now be booked.

NEW COMPANY REGISTERED.

Pickford Trown and Co., Ltd.—Capital £3,000, in £1 shares. Engineers, manufacturers and repairers of flying machines, aeroplanes, &c. Formed to acquire the business carried on by E. H. Pickford at 264 and 266, Ecclesall Road, Sheffield.

PUBLICATIONS RECEIVED.

The Aviator's Companion. By Dick and Henry Farman and others. London: Mills and Boon. Price 2s. 6d. net.

Catalogues.

Wolsley Motor Launches and Cruising Yachts. The Wolsley Tool and Motor Car Co., Ltd., Adderley Park, Birmingham.

IMPORTS AND EXPORTS, 1910.

Aeroplanes, airships, balloons and parts thereof (not shown separately before 1910).

Imports.		Exports.		Re-Exportation.	
	£		£		£
January ...	2,516	January ...	750	January ...	550
February ...	437	February ...	2,950	February ...	—
March ...	7,516	March ...	128	March ...	600
April ...	6,305	April ...	950	April ...	1,470
May ...	846	May ...	400	May ...	350
June ...	7,961	June ...	642	June ...	558
July ...	11,608	July ...	336	July ...	830
7 months ...	37,189	7 months ...	6,156	7 months ...	4,358

Aeronautical Patents Published.

Applied for in 1909.

Published August 11th, 1910.

16,430.	W. VOLLBRECHT.	Supporting body for airships.
16,707.	H. WATSON.	Aerial craft.
17,343.	G. H. BROWN-EKINS.	Aeroplanes, &c.
17,569.	N. VON L. TAPSCOTT.	Aeroplanes.
23,666.	H. RUTHENBERG.	Airships.
26,549.	L. DUTHEIL, R. CHALMERS AND CO.	Aviation and aerostation.
26,601.	F. C. ROSSEL.	Aeroplanes.

DIARY OF FORTHCOMING EVENTS.

British Events.

1910.	
Aug. 6-13	Lanark.*
Aug. 15-20	Blackpool.

1910.	
Aug. 29-30	Dublin.
Sept. 1-3	Folkestone.

Foreign Events.

1910.	
Aug. 6-21	Circuit de l'Est (Matin).
Aug. 14-21	Nantes.
Aug. 25-Sept. 4	Havre-Trouville.*
Sept. 11-18	Bordeaux.*
Sept. 24-Oct. 3	Milan.*
Sept. 25-Oct. 3	Biarritz.

1910.	
Oct. 15-23	New York. Gordon-Bennett Aviation Cup.
Oct. 18-25	St. Louis. Gordon-Bennett Balloon Race.
Dec. 4-18	Marseilles.

* International.

BACK NUMBERS OF "FLIGHT."

SEVERAL back numbers are now very scarce, and have been raised in price as follows:—

	1909.		s. d.
No. 2, Jan. 9, containing	Table of Propellers ...	1	6
6, Feb. 6, "	" "How Men Fly" ...	0	6
	Aeronautical Bibliography.		
8, " 20, "	Wright Bros.' Elevator Patents.	1	0
	Flying Ground at Farnbridge		
10, Mar. 6, "	Illustrated Glossary.		
	Human Side of Flying ...	1	0
	Aero Club Ground at Shellbeach.		
	Military Aeronautics.		
12, " 20, "	Souvenir Supplement ...	1	6
15, Apr. 10, "	Engines at Olympia ...	1	0
16, " 17, "	Prize List ...	3	6
	Models at Olympia.		
31, July 31, "	Blériot Flyer ...	2	0
	(Full page drawing.)		

Other back numbers (excepting Nos. 3 and 4, which are out of print), post free, $1\frac{1}{2}$ d. each, including descriptions and scale drawings of the Voisin (Nos. 33 and 34), Curtiss (No. 27), Cody (No. 34), Farman (No. 42), and Wright (No. 63) biplanes, the Santos Dumont (Nos. 40 and 41), Antoinette (Nos. 43 and 44), and Grade (No. 50) monoplanes, and of a full-size Wright glider (Nos. 38 and 39).

BINDING COVERS for Vol. I, price 2s. 4d., post free.

TITLE PAGE and INDEX for Vol. I, 2d., post free.

Readers' own copies bound, price 4s. per part (including cover, title page, and index, postage extra).

VOLUME I, bound complete with all scarce numbers, 25s., post free; in two parts, 28s. 6d., complete.

Prices of special binding on application.

FLIGHT.

44, ST. MARTIN'S LANE, LONDON, W.C.

Telegraphic address: Truditor, London. Telephone: 1828 Gerrard.

SUBSCRIPTION RATES.

FLIGHT will be forwarded, post free, to any part of the world at the following rates:—

UNITED KINGDOM.		ABROAD.	
	s. d.		s. d.
3 Months, Post Free ...	1 8	3 Months, Post Free ...	2 6
6 " " " " " " " " " " " "	3 3	6 " " " " " " " " " " " "	5 0
12 " " " " " " " " " " " "	6 6	12 " " " " " " " " " " " "	10 0

Cheques and Post Office Orders should be made payable to the Proprietors of FLIGHT, 44, St. Martin's Lane, W.C., and crossed London and County Bank, otherwise no responsibility will be accepted. Should any difficulty be experienced in procuring FLIGHT from local newsvendors, intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.